

Against Terrestrial Leftism



An Anthology

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Prelude to the Space Age: Heavenly Bodies, Socialism, and Fiction

“Marx did not call for an opposition to the forces of history. On the contrary he accepted all of them, the drive of technology, the revolutionizing effects of democratic striving, even the vagaries of capitalism, as being indeed the carriers of a brighter future.”

-Robert Heilbroner

Introduction to On The Revolutions By Nicolas Copernicus

Among the many various literary and artistic pursuits which invigorate men's minds, the strongest affection and utmost zeal should, I think, promote the studies concerned with the most beautiful objects, most deserving to be known. This is the nature of the discipline which deals with the universe's divine revolutions, the asters' motions, sizes, distances, risings and settings, as well as the causes of the other phenomena in the sky, and which, in short, explains its whole appearance. What indeed is more beautiful than heaven, which of course contains all things of beauty? This is proclaimed by its very names (in Latin), *caelum* and *mundus*, the latter denoting purity and ornament, the former a carving. On account of heaven's transcendent perfection most philosophers have called it a visible god. If then the value of the arts is judged by the subject matter which they treat, that art will be by far the foremost which is labeled astronomy by some, astrology by others, but by many of the ancients, the consummation of mathematics. Unquestionably the summit of the liberal arts and most worthy of a free

man, it is supported by almost all the branches of mathematics. Arithmetic, geometry, optics, surveying, mechanics and whatever others there are all contribute to it.

Although all the good arts serve to draw man's mind away from vices and lead it toward better things, this function can be more fully performed by this art, which also provides extraordinary intellectual pleasure. For when a man is occupied with things which he sees established in the finest order and directed by divine management, will not the unremitting contemplation of them and a certain familiarity with them stimulate him to the best and to admiration for the Maker of everything, in whom are all happiness and every good? For would not the godly Psalmist (92:4) in vain declare that he was made glad through the work of the Lord and rejoiced in the works of His hands, were we not drawn to the contemplation of the highest good by this means, as though by a chariot?

The great benefit and adornment which this art confers on the commonwealth (not to mention the countless advantages to individuals) are most excellently observed by Plato. In the Laws, Book VII, he thinks that it should be cultivated chiefly because by dividing time into groups of days as months and years, it would keep the state alert and attentive to the festivals and sacrifices. Whoever denies its necessity for the teacher of any branch of higher learning is thinking foolishly, according to Plato. In his opinion it is highly unlikely that anyone lacking the requisite knowledge of the sun, moon, and other heavenly bodies can become and be called godlike.

However, this divine rather than human science, which investigates the loftiest subjects, is not free from perplexities. The main reason is that its principles and assumptions, called "hypotheses" by the Greeks, have been a source of disagreement, as we see, among most of those who undertook to deal with this subject, and so they did not rely on

the same ideas. An additional reason is that the motion of the planets and the revolution of the stars could not be measured with numerical precision and completely understood except with the passage of time and the aid of many earlier observations, through which this knowledge was transmitted to posterity from hand to hand, so to say. To be sure, Claudius Ptolemy of Alexandria, who far excels the rest by his wonderful skill and industry, brought this entire art almost to perfection with the help of observations extending over a period of more than four hundred years, so that there no longer seemed to be any gap which he had not closed. Nevertheless very many things, as we perceive, do not agree with the conclusions which ought to follow from his system, and besides certain other motions have been discovered which were not yet known to him. Hence Plutarch too, in discussing the sun's tropical year, says that so far the motion of the heavenly bodies has eluded the skill of the astronomers. For, to use the year itself as an example, it is well known, I think, how different the opinions concerning it have always been, so that many have abandoned all hope that an exact determination of it could be found. The situation is the same with regard to other heavenly bodies.

Nevertheless, to avoid giving the impression that this difficulty is an excuse for indolence, by the grace of God, without whom we can accomplish nothing, I shall attempt a broader inquiry into these matters. For, the number of aids we have to assist our enterprise grows with the interval of time extending from the originators of this art to us. Their discoveries may be compared with what I have newly found. I acknowledge, moreover, that I shall treat many topics differently from my predecessors, and yet I shall do so thanks to them, for it was they who first opened the road to the investigation of these very questions.

The Romance of the Moon

From: From the Earth to the Moon by Jules Verne

An observer endued with an infinite range of vision, and placed in that unknown center around which the entire world revolves, might have beheld myriads of atoms filling all space during the chaotic epoch of the universe. Little by little, as ages went on, a change took place; a general law of attraction manifested itself, to which the hitherto errant atoms became obedient: these atoms combined together chemically according to their affinities, formed themselves into molecules, and composed those nebulous masses with which the depths of the heavens are strewn. These masses became immediately endued with a rotary motion around their own central point. This center, formed of indefinite molecules, began to revolve around its own axis during its gradual condensation; then, following the immutable laws of mechanics, in proportion as its bulk diminished by condensation, its rotary motion became accelerated, and these two effects continuing, the result was the formation of one principal star, the center of the nebulous mass.

By attentively watching, the observer would then have perceived the other molecules of the mass, following the example of this central star, become likewise condensed by gradually accelerated rotation, and gravitating round it in the shape of innumerable stars. Thus was formed the *Nebulae*, of which astronomers have reckoned up nearly 5,000. Among these 5,000 nebulae there is one which has received the name of the Milky Way, and which contains eighteen millions of stars, each of which has become the center of a solar world.

If the observer had then specially directed his attention to one of the more humble and less brilliant of these stellar bodies, a star of the fourth class, that which is arrogantly called the Sun, all the phenomena to which the formation of the Universe is to be ascribed would have been successively fulfilled before his eyes. In fact, he would have

perceived this sun, as yet in the gaseous state, and composed of moving molecules, revolving round its axis in order to accomplish its work of concentration. This motion, faithful to the laws of mechanics, would have been accelerated with the diminution of its volume; and a moment would have arrived when the centrifugal force would have overpowered the centripetal, which causes the molecules all to tend toward the center. Another phenomenon would now have passed before the observer's eye, and the molecules situated on the plane of the equator, escaping like a stone from a sling of which the cord had suddenly snapped, would have formed around the sun sundry concentric rings resembling that of Saturn. In their turn, again, these rings of cosmical matter, excited by a rotary motion about the central mass, would have been broken up and decomposed into secondary nebulosities, that is to say, into planets. Similarly he would have observed these planets throw off one or more rings each, which became the origin of the secondary bodies which we call satellites.

Thus, then, advancing from atom to molecule, from molecule to nebulous mass, from that to principal star, from star to sun, from sun to planet, and hence to satellite, we have the whole series of transformations undergone by the heavenly bodies during the first days of the world.

Now, of those attendant bodies which the sun maintains in their elliptical orbits by the great law of gravitation, some few in turn possess satellites. Uranus has eight, Saturn eight, Jupiter four, Neptune possibly three, and the Earth one. This last, one of the least important of the entire solar system, we call the Moon; and it is she whom the daring genius of the Americans professed their intention of conquering.

The moon, by her comparative proximity, and the constantly varying appearances produced by her several phases, has always occupied a considerable share of the attention of the inhabitants of the earth.

From the time of Thales of Miletus, in the fifth century B.C., down to that of Copernicus in the fifteenth and Tycho Brahe in the sixteenth century A.D., observations have been from time to time carried on with more or less correctness, until in the present day the altitudes of the lunar mountains have been determined with exactitude. Galileo explained the phenomena of the lunar light produced during certain of her phases by the existence of mountains, to which he assigned a mean altitude of 27,000 feet. After him Hevelius, an astronomer of Dantzic, reduced the highest elevations to 15,000 feet; but the calculations of Riccioli brought them up again to 21,000 feet.

At the close of the eighteenth century Herschel, armed with a powerful telescope, considerably reduced the preceding measurements. He assigned a height of 11,400 feet to the maximum elevations, and reduced the mean of the different altitudes to little more than 2,400 feet. But Herschel's calculations were in their turn corrected by the observations of Halley, Nasmyth, Bianchini, Gruithuysen, and others; but it was reserved for the labors of Boer and Maedler finally to solve the question. They succeeded in measuring 1,905 different elevations, of which six exceed 15,000 feet, and twenty-two exceed 14,400 feet. The highest summit of all towers to a height of 22,606 feet above the surface of the lunar disc. At the same period the examination of the moon was completed. She appeared completely riddled with craters, and her essentially volcanic character was apparent at each observation. By the absence of refraction in the rays of the planets occulted by her we conclude that she is absolutely devoid of an atmosphere. The absence of air entails the absence of water. It became, therefore, manifest that the Selenites, to support life under such conditions, must possess a special organization of their own, must differ remarkably from the inhabitants of the earth. At length, thanks to modern art, instruments of still higher perfection searched the moon without intermission, not leaving a single point of her surface unexplored; and notwithstanding that her diameter measures 2,150 miles, her surface equals the one-

fifteenth part of that of our globe, and her bulk the one-forty-ninth part of that of the terrestrial spheroid— not one of her secrets was able to escape the eyes of the astronomers; and these skillful men of science carried to an even greater degree their prodigious observations.

Thus they remarked that, during full moon, the disc appeared scored in certain parts with white lines; and, during the phases, with black. On prosecuting the study of these with still greater precision, they succeeded in obtaining an exact account of the nature of these lines. They were long and narrow furrows sunk between parallel ridges, bordering generally upon the edges of the craters. Their length varied between ten and 100 miles, and their width was about 1,600 yards. Astronomers called them chasms, but they could not get any further. Whether these chasms were the dried-up beds of ancient rivers or not they were unable thoroughly to ascertain.

The Americans, among others, hoped one day or other to determine this geological question. They also undertook to examine the true nature of that system of parallel ramparts discovered on the moon's surface by Gruithuysen, a learned professor of Munich, who considered them to be "a system of fortifications thrown up by the Selenitic engineers." These two points, yet obscure, as well as others, no doubt, could not be definitely settled except by direct communication with the moon.

Regarding the degree of intensity of its light, there was nothing more to learn on this point. It was known that it is 300,000 times weaker than that of the sun, and that its heat has no appreciable effect upon the thermometer. As to the phenomenon known as the "ashy light," it is explained naturally by the effect of the transmission of the solar rays from the earth to the moon, which give the appearance of completeness to the lunar disc, while it presents itself under the crescent form during its first and last phases.

Such was the state of knowledge acquired regarding the earth's satellite, which the Gun Club undertook to perfect in all its aspects, cosmographic, geological, political, and moral.

Galileo's Revolution by Ansar Fayyazuddin

From: Against the Current no. 171

THIS YEAR MARKS the 450th anniversary of Galileo's birth. Modern telescopes, which make visible the far reaches of the universe and take us back in time to the moments when the universe was still small, are related by direct lineage to Galileo, who first turned the telescope heavenward and started asking questions that continue to stir us.

What is the relevance of Galileo today? Why remember him so prominently when so many other important scientists are not? Einstein identifies one set of reasons in his foreword to Galileo's *Dialogue Concerning the Two Chief World Systems*:

“A man is here revealed who possesses the passionate will, the intelligence, and the courage to stand up as the representative of rational thinking against the host of those who, relying on the ignorance of the people and the indolence of teachers in priest's and scholar's garb, maintain and defend their positions of authority. His unusual literary gift enables him to address the educated men of his age in such clear and impressive language as to overcome the anthropocentric and mythical thinking of his contemporaries...

Einstein wrote the Foreword from his American exile, having escaped one authoritarian regime to find himself having to stand up to another, albeit one of a much different

character. Bertolt Brecht, also having escaped the same murderous Nazi regime, found himself hounded by the HUAC during his American sojourn, and, increasingly unable to abide by the stultifying dogmas and authoritarianism of the Communist parties. Brecht, who wrote a play chronicling Galileo's condemnation, saw Galileo as a kindred spirit.

The Prevailing Dogmas

Galileo Galilei was born in 1564 in the Tuscan city of Pisa. In traditional periodization, this corresponds to the late Renaissance or, more generally, the Early Modern Period.

Soon after Galileo's birth, his family moved to Florence, where he grew up. Florence, a major center of the Renaissance had by this stage combined with other smaller city states, including Pisa, to form the relatively large Republic of Tuscany.

The Catholic Counter-Reformation was in full swing, policing the Catholic dominions to the extent that it could through the Roman Inquisition and the Censor. The Censor produced the so-called Index specifying proscribed texts and ideas.

While the Counter-Reformation tried to exert Catholic orthodoxy in the kingdoms of Italy, another set of dogmas held sway at the universities. By the mid 16th century, the ancient texts that had sparked the intellectual revival of the Renaissance formed the basis of a new secular orthodoxy. Intellectual life at the universities was confined largely to interpreting and transmitting these texts.

Knowledge was considered to be that which could be extracted from these texts rather than from material experience. Aristotelian philosophy reigned supreme. Some aspects of Aristotelian philosophy were even incorporated into Catholic dogma. Thomas Aquinas had inducted the Ptolemaic synthesis of Aristotelian astronomy into Church doctrine.

Thus Ptolemaic astronomy had the imprimatur of both the Church and the secular philosophers based at the universities. It may be useful to briefly linger on some key features of Aristotelian physics and astronomy.

Aristotle conceived of terrestrial matter and heavenly bodies as possessing fundamentally different natures. Terrestrial matter, according to Aristotle, is composed of four elements: fire, air, water, and earth. These elements have basic properties, chief among them being natural motion.

All natural motion is vertical: light elements rise while heavy ones fall. Fire is the lightest of the elements, earth the heaviest, while air and water are intermediate on this scale. Horizontal motion is not “natural” and requires the application of external force (“violent motion”).

The natural properties of any object, according to Aristotle, are determined by the proportions of the basic elements in the composition of the object in question. Heavenly bodies, on the other hand, are composed of aether, which is supposed to be “incorruptible,” i.e. unchanging and permanent.

Aristotle conceived the universe as earth-centric, with the static (non-rotating and unmoving) earth occupying the geometric center of the universe. Concentric, uniformly rotating spherical shells on which the sun, moon, and planets were affixed accounted for various observed cyclic phenomena — such as the daily cycle of night and day through the purported rotation of the sun's spherical shell.

The outermost shell of this system was fixed and held the stars in place. The stars were fixed in space and eternal. All heavenly bodies and the rotating concentric shells were perfect spheres.

Ptolemy introduced two innovations to bring the Aristotelian system closer in line with observations. The first was “eccentricity,” which allowed the Aristotelian shells to be centered somewhat off the earth. The second, “epicycles,” allowed for more complicated planetary motion than uniform circular movement about the center of its spherical shell.

Epicycles are circular orbits about a fixed point on a rotating spherical shell — so an epicycle describes a circle around a point, which itself orbits the earth in a circle. Epicycles were to become a symbol of the complicated contortions that Ptolemaic astronomy was forced to introduce in order to remain observationally viable.

Skeptic and Inventor

Galileo's early career was spent as a professor of mathematics at the universities of Pisa in Tuscany, and subsequently at Padua in the Venetian Republic, before finally moving

back to Florence. His early university career was dominated by traditional Aristotelian preoccupations. Personal debt forced Galileo to seek other sources of income to supplement his university salary. He took on students to tutor, which besides augmenting his salary gave him a venue to explore ideas outside of the university.

It is in the notes that he prepared for his private tutorials that the first hints of his skepticism towards Aristotelian astronomy and mechanics appear. Besides tutoring, Galileo's activities outside the university included consulting for the Venetian government on military matters.

He further supplemented his income by manufacturing and selling a series of inventions and other devices. The inventions included a calculator based on a proportional divider, and a thermometer. Later, he manufactured and sold telescopes and compound microscopes, after hearing of these Dutch inventions. His engagement in these more “applied” problems, as opposed to the rarefied preoccupations of the academy, probably contributed to Galileo developing a more practical approach to problem solving and confronting Aristotelian mechanics with the real world.

A pivotal year in Galileo's life and for the history of science was 1609, when Galileo first got word of the telescope. Inspired by the reports he received of this Dutch invention, he tried to construct the instrument himself and, on successfully building one that made objects appear a third of the distance away and nine times as big, he immediately constructed one that made objects appear sixty times their size.

Galileo describes what happened next in his book *The Starry Messenger*:

“It would be superfluous to enumerate the number and importance of the advantages of such an instrument at sea as well as on land. But forsaking terrestrial observations, I turned to celestial ones, and first I saw the moon from as near at hand as if it were scarcely two terrestrial radii away. After that I observed often with wondering delight both the planets and the fixed stars, and since I saw these latter to be very crowded, I began to see (and eventually found) a method by which I might measure their distances apart.”

What Galileo Observed

The book goes on to explain in plain language Galileo's observations and deductions about heavenly bodies that were subsequently largely confirmed and remain part of our accepted body of knowledge to this day. *The Starry Messenger* is a truly remarkable book that quietly sets aside the Aristotelian view of the special nature of celestial matter, and treats it as if it were no different from terrestrial matter.

This radical departure characterizes much of Galileo's thinking — he showed a facility for discarding cumbersome received wisdom if he could do with a simpler, more plausible set of assumptions instead.

When Galileo observed the moon through his telescope, he did not see a perfect sphere but a body that was pockmarked and jagged. He wrote that from these observations “I have been led to the opinion and conviction that the surface of the moon is not smooth,

uniform, and precisely spherical as a great number of philosophers believe it (and the other heavenly bodies) to be, but is uneven, rough, and full of cavities and prominences, being not unlike the face of the earth, relieved by chains of mountains and deep valleys.”

He observed that the darkened and lit parts of the moon were divided not by a smooth line, but by a jagged one, and that the lit part of the moon contained darkened spots that shifted. He found all of this to be consistent with a rough lunar terrain containing mountains and craters. He argued that the glow of the moon is the reflected light of the sun, and that the dark spots in the lit part of the moon are the shifting shadows produced as the moon moves in relation to the sun.

Perhaps the most remarkable part of *The Starry Messenger* is the discussion of the secondary lighting of the moon. Galileo observes that there is a faint lighting of the moon's surface that cannot be explained by the light emanating from the sun.

After discarding some possible explanations, he poses his own solution: sunlight reflected off the earth provides the secondary light on the moon. Galileo expresses this in beautiful prose: “The earth, in fair and grateful exchange, pays back to the moon an illumination similar to that which it receives from her throughout nearly all the darkest gloom of night.”

The symmetry between the moon and the earth is stark. A little later, in two startling sentences a few paragraphs apart, Galileo asks the reader to consider what would be

visible from Venus and from the moon — a far more radical departure than Copernicus' quite literal decentering of the earth.

Copernicus places the earth away from the geometric center of the universe, but does not necessarily deny the privileged position of earth as the observation point. In Galileo's text, we are asked to imagine what the universe would look like for observers from multiple possible positions, none of which enjoy an inherently privileged status.

I cannot dwell much longer on this remarkable book, but I would be remiss not to mention some of its highlights. Throughout the book, the working assumption is that the earth rotates about its axis and orbits the sun, while the moon, in turn, orbits the earth.

Galileo explains the phases of the moon, computes the height of a lunar mountain, establishes the existence of four moons orbiting Jupiter based on his extended observations, and argues that the Milky Way is not a band of light but, in fact, composed of a multitude of stars. He also explains the difference between stars, planets and the moons of planets in terms of which produce their own light and which shine due to reflected light from the sun.

Dangerous Fame

Publication of *The Starry Messenger* brought Galileo instant fame. But along with his great celebrity came a barrage of criticisms, from both secular and religious sources.

Secular critics, upset by the inherent rejection of Aristotelian astronomy, questioned the efficacy of the telescope in revealing the nature of viewed objects without distortion. They also found Galileo's explanations incomplete, since he didn't explain how unattached heavenly bodies could fail to fall onto the earth and why the earth's rotation does not result in vicious winds that would create havoc on earth.

Galileo had no doubt that the objects and phenomena he observed through the telescope had a consistency that was not compatible with hypothetical distortions produced by the telescope. He was also convinced that his hypothesis of untethered planets and stars was correct, and there would ultimately be a viable explanation for why they do not fall to earth. The lack of winds due to the rotation and motion of the earth was explained by Galileo (see below) by understanding sufficiently well what we now call the principle of inertia.

The religious criticisms centered on his adoption of the Copernican hypothesis of a heliocentric universe, a view counter to the doctrines of the Catholic Church.

Physics was Galileo's life-long intellectual preoccupation that predated his interest in astronomy. Today, astronomy is a subfield of physics. This was not the case in Galileo's time when the Aristotelian distinction between corruptible (terrestrial) and incorruptible (heavenly) matter held sway.

Paradoxically, astronomy was always a subject rooted in detailed measurements, while physics was based on qualitative principles that were not tested in quantitative detail.

Perhaps Galileo's most important contribution to physics was to make measurement a central aspect of the practice of physics.

As Galileo started to bring measurement to bear on determining new physical laws and establishing the veracity of purported laws, the Aristotelian edifice started to crumble. During his Pisa years, Galileo was able to disprove Aristotle's contention that objects of different masses fall differently under the influence of gravity.

While the story of Galileo dropping two objects of widely different masses from the tower of Pisa is probably apocryphal, it is the case that both theoretical considerations and everyday experience led Galileo to the law that two objects made of the same material but of different masses would fall in the same way and would hit the ground simultaneously if dropped from the same height.

Galileo went on to discover a number of remarkable regularities through observation, which he formulated in mathematical terms. For instance, he discovered the counterintuitive fact that a pendulum of fixed length takes the same amount of time to return to its original position independently of how far the pendulum is swung from its equilibrium position.

An even more impressive feat was to establish that projectile motion (the motion of an object under the influence of gravity) followed a parabolic trajectory. Galileo established this mathematical law by meticulous and ingenious experiments in which he studied the

motion of objects on slightly inclined planes, effectively tuning the vertical acceleration down so he could measure accurately the position of an object as a function of time.

Another general law that Galileo formulated in a limited form was the law of inertia — that all observers travelling at constant velocities with respect to each other see the same physics.

To the question “where would an object dropped from a ship's crow's nest land on the deck of a ship moving at constant velocity?” Galileo answered unhesitatingly: the object would land at the bottom of the mast. In Galileo's view, the dropped object is moving with the ship and one cannot, by conducting an experiment of this sort, distinguish between a stationary ship or a uniformly moving one.

In fact, the distinction between a moving and stationary ship is based on a convention that certain objects on earth (trees, say) are stationary. This powerful realization addressed (with some caveats) why the motion of the earth (both around its axis and around the sun) does not produce violent winds — the reason being that the air moves with the earth rather than remaining stationary with respect to the moving earth.

The centrality of quantitative measurements to Galileo's physics meant that, for Galileo, mathematics was necessary in formulating physical laws. Yet Galileo was clear on the very different natures of mathematics and physics.

Galileo understood that mathematical knowledge could be perfect in the sense that mathematical statements could, in principle, be shown to be true or false by employing the rules of mathematics alone. This was not the case with physics: All measurements were necessarily approximate, and all confirmations of physical laws were perforce subject to caveats of precision of measurement, control over extraneous disturbances, etc.

On Trial

To this already complex epistemology, Galileo added considerations on the relationship between science and theology. As Galileo came under increasingly frequent attack for his heretical Copernican views, he addressed the general problem posed by the clash of scientific knowledge and the literal meaning of the Bible in his Letter to the Grand Duchess Christina.

In this manuscript, he asserts that observations and experience should always have priority as tests of the truth of propositions about nature. When the literal meaning of the Bible is in contradiction with observation, then the only available recourse to someone who believes in the sacred nature of the Bible is to reject the literal meaning in favor of another interpretation, whether one is readily available or not.

In this carefully argued book, Galileo wields his polemical powers to great effect in arguing against the devout extractors of “knowledge” about the natural world through reading the Bible: “But I do not feel obliged to believe that that same God who has endowed us with senses, reason and intellect has intended to forgo their use and by some

other means to give us knowledge which we can attain by them.” This book should be required reading for arguing against present day creationists.

Galileo's attitude towards philosophers was similar to what he expressed against the biblical literalists — the authority of select philosophers could not outweigh observation. He poked fun at the philosophers by giving credence to the lived experiences of uneducated artisans and peasants over the bookish assertions of academicians.

The trial of Galileo by the Roman Inquisition is now a legend. Galileo was condemned for the ostensible offense of treating Copernican astronomy as fact in his *Dialogue Concerning the Two Chief World Systems*.

The *Dialogue* was an explication of Galileo's theory of tides in the form of a dialogue among three interlocutors: Salviatti, Sagredo and Simplicio. Simplicio represented the Aristotelian view whose ideas were undercut by the more compelling Salviatti, while Sagredo, the neutral party, asked the two rivals questions pushing the conversation forward.

Galileo's explanation of the phenomena of tides, now discredited, was based on the two forms of motion the earth executes — the daily rotation about its axis and the yearly revolution around the sun.

Belief in both forms of motion was considered to be heretical by the Inquisition. But it was probably the insult of treating the static earth as a ridiculous proposition and putting

the words of the current Pope in Simplicio's unconvincing mouth that must have really stung(10) and brought the matter to such an outrageous conclusion.

Galileo was brought to Rome in frail health in early 1633 and condemned by the Inquisition for the crime of heresy and sentenced to indefinite imprisonment. This devastating sentence was thankfully commuted to house arrest due to the intervention of an Archbishop, who was allowed to keep him in his custody in Siena.

By the end of 1633, Galileo was allowed to move to his villa in Florence but still kept under house arrest. Galileo was to remain there until his death in 1642.

Democratic Spirit of Science

Galileo, shattered though he was by the condemnation and the inordinately harsh sentence, managed, with the encouragement of friends, to return to his work on physics. In the resulting book, *Two New Sciences*, written between 1634 and 1637 and published in 1638, Galileo again adopted the dialogue form, keeping the same three interlocutors as those of his book on tides.

The subjects of this new book were what preoccupied him his entire life: motion and the physics of materials. It is considered to be his most important work, prefiguring many aspects of the continuum mechanics of Newton. But it is the science of materials that again illustrated how Galileo prioritized experience over logic.

The opening dialogue explains an idea that remains counterintuitive: an object made proportionately larger or smaller, does not become proportionately stronger or weaker. The central reference point of this dialogue is the lived experience of the artisan, who knows that columns that are proportionately enlarged are weaker than the smaller versions of themselves since they must withstand their own weight in addition to the weight of the structure they support.

Galileo explains what this implies about the strength of materials. That this remains a point of confusion to this day is illustrated by the fact that J. B. S. Haldane's most famous essay "On Being the Right Size," written in the first half of the 20th century, was written to dispel exactly the same set of wrong ideas as Galileo's dialogue does. Yet Hollywood blockbusters continue unmoved to show humans shrunk to the size of ants and ants blown up to the size of elephants.

The democratic spirit of science — that the world can be understood not just by geniuses but by everyone — is evident everywhere in Galileo. This spirit is not just present unconsciously, but expressed quite explicitly:

"I wrote in the colloquial tongue because I must have everyone able to read it, and for the same reason I wrote my last book in this language [Italian]. I am induced to do this by seeing how young men are sent through the universities at random to be made physicians, philosophers, and so on; thus many of them are committed to professions for which they are unsuited, while other men who would be fitted for these are taken up by family cares and other occupations remote from literature. The latter are, as Ruzzante would say, furnished with 'horse sense,' but because they are unable to read things that

are 'Greek to them' they become convinced that in those 'big books there are great new things of logic and philosophy and still more that is way over their heads.' Now I want them to see that just as nature has given them, as well as philosophers, eyes with which to see her works, so she has also given them brains capable of penetrating and understanding them."

Amen.

Planets are Inhabited by Living Creatures

by Konstantin Tsiolkovsky, Founding Father of Astronautics

Many well-educated and worldwide-known scientists disbelieve existence of animals on other planets on the grounds that nobody saw them and they do not show themselves. Likewise, for a long time Europeans believed that there is no America and people living there.

Here we want to prove the contrary: it is quite impossible to doubt inhabitation of numberless planets.

There is undoubted knowledge, although currently it is impossible to verify it. For example, chemical composition of suns' surface is known in theory. However, we have not hold a single crumb of their substance in our hands. Much is known about celestial bodies. For example, their sizes, distances, densities. But nobody measured all this directly, and only theoretical verification of this knowledge is possible. Nobody saw atoms, however, they undoubtedly exist. Similarly, there are solid grounds for complete confidence in existence of numerous units of nonearthly habitants.

Which are these grounds? We will name them.

1. All these trillions of suns and all rarefied gaseous masses of the above consist of the same substance as the Earth is composed of.
2. All planets separated from suns. Therefore, they are also composed of the same matter as the matter which our planet is formed of.
3. All celestial bodies are subject to gravity. Therefore, weight is found on all planets.
4. There are liquids and gases on all major planets.
5. All planets are exposed to the same rays of their suns.

6. Almost all planets have day-and-night cycles and seasons.

It is evident from the above that planets from various solar systems differ from one another only quantitatively, not qualitatively. Well, they are of different size, have different gravity, different depth of their oceans, different atmospheric depth, they have different mean temperature, different duration of day-and-night cycles and year, different harshness of climate, etc. But, certainly, there are planets extremely similar to the Earth.

There are about ten major planets and a thousand of small ones near every sun. At least one of the large ones resembles the Earth - by temperature, size, gravity, water and air, etc. Well, how could one deny organic life on them?

One could count a million of billions of suns in the known Universe. So, we have the same number of planets similar to the Earth. It is implausible to deny life on them. If life was conceived on the Earth, why it could not emerge in the same conditions on planets similar to the Earth? There can be less of them than the number of suns, but, however, they must be. It is possible to deny life on 50, 70, 90 percent of all these planets, but not on all of them – it is quite impossible.

Besides, why should the difference of conditions eliminate life? On our planet there are places with different temperature, different environment (water, air, soil), and other conditions do vary as well. However, is there a place with no plants and animals on the Earth? They can be found everywhere - even in arctic snows, on heights and in depths. Absence of light, cold, heat - nothing stops development of living organisms on the Earth. Therefore, each sun has not just one inhabited planet, but, probably, a few of them.

Technical force of humanoid creatures matters a good deal as well. Thanks to it, a man on the Earth can organize a comfortable life on poles and in deserts, on mountains and

under water, above earth and in aether, and anywhere else. It is especially true for our mighty descendants.

What are the grounds for denial of reasonable planetary beings in the Universe? We will name these grounds.

We are told: if there were any, they would have visited the Earth. My answer is: maybe, they will visit us, but time has not come yet for this. Savage Australians and Americans of ancient centuries saw Europeans visit them - but many millenniums passed before they arrived. Similarly, we will see such a visit in some time. At other planets, maybe, their mighty habitants for a long time have been visiting one another.

We are also objected: if they existed, they would have shown us some signs of their existence.

My answer is: our facilities are too weak to perceive these signs. Our celestial neighbours understand that at the certain level of knowledge people themselves will definitely prove inhabitation of another planets. In addition, there is no good of informing about inhabitation of planets lower animals from the Earth, along with majority of humankind - because of low degree of their development. What if this knowledge does harm? What if massacres and St. Bartholomew's nights occur due to this?

Time must pass until the average level of humankind's development is sufficient for nonearthly dwellers to visit us.

We - brothers - kill one another, wage wars, treat animals cruelly. How will we treat the creatures who are quite alien to us? What if we consider them rivals in owning the Earth and destroy ourselves in a one-sided fight? They cannot wish such a fight and death. Humankind is as far in development from more perfect planetary creatures, as lower animals are from people. We do not go on a visit to wolves, venomous snakes or

gorillas. We only kill them. Perfect animals from the cosmos do not want to do the same with us.

Could we carry out reasonable communication with dogs and monkeys? Similarly, higher creatures are powerless to communicate with us so far.

On the other hand, there is a number of strange facts that prove participation of another creatures in our life. It already directly confirms existence of another, more mature, organisms.

Excerpt about Physics and Space

From: Anti-Dühring by Frederick Engels

The Kantian theory of the origin of all existing celestial bodies from rotating nebular masses was the greatest advance made by astronomy since Copernicus. For the first time the conception that nature had no history in time began to be shaken. Until then the celestial bodies were believed to have been always, from the very beginning, in the same states and always to have followed the same courses; and even though individual organisms on the various celestial bodies died out, nevertheless genera and species were held to be immutable. It is true that nature was obviously in constant motion, but this motion appeared as an incessant repetition of the same processes. Kant made the first breach in this conception, which corresponded exactly to the metaphysical mode of thought, and he did it in such a scientific way that most of the proofs furnished by him still hold good today. At the same time, the Kantian theory is still, strictly considered, only a hypothesis. But the Copernican world system, too, is still no more than this, and since the spectroscopic proof of the existence of such red-hot gaseous masses in the starry heavens, proof that brooks no contradiction, the scientific opposition to Kant's theory has been silenced. Even Herr Dühring cannot complete his construction of the world without such a nebular stage, but takes his revenge for this by demanding to be shown the mechanical system existing in this nebular stage, and because no one can show him this, he applies all kinds of depreciatory epithets to this nebular stage of the universe. Contemporary science unfortunately cannot describe this system to Herr Dühring's satisfaction. Just as little is it able to answer many other questions. To the question: Why do toads have no tails? — up to now it has only been able to answer: Because they have lost them. But should anyone get excited over that and say that this is to leave the whole question in the vagueness and formlessness of an idea of loss which cannot be determined more closely, and that it is an extremely airy conception, such an

application of morality to natural science does not take us one step further. Such expressions of dislike and bad temper can be used always and everywhere, and just for that reason they should never be used anywhere. After all, who is stopping Herr Dühring from himself discovering the mechanical system of the primordial nebula?

Fortunately we now learn that the Kantian nebular mass “is far from coinciding with a completely identical state of the world medium, or, to put it another way, with the self-equal state of matter”

It was really fortunate for Kant that he was able to content himself with going back from the existing celestial bodies to the nebular ball, and did not even dream of the self-equal state of matter! It may be remarked in passing that when contemporary natural science describes the Kantian nebular ball as primordial nebula, this, it goes without saying, is only to be understood in a relative sense. It is primordial nebula, on the one hand, in that it is the origin of the existing celestial bodies, and on the other hand because it is the earliest form of matter which we have up to now been able to work back to. This certainly does not exclude but rather implies the supposition that before the nebular stage matter passed through an infinite series of other forms.

Herr Dühring sees his advantage here. Where we, with science, stand still for the time being at what for the time being is deemed primordial nebula, his science of sciences helps him much further back to that

“state of the world medium which cannot be understood either as purely static in the present meaning of the idea, or as dynamic” —

which therefore cannot be understood at all.

“The unity of matter and mechanical force which we call the world medium is what might be termed a logical-real formula for indicating the self-equal state of matter as the prerequisite of all innumerable stages of evolution”

We are clearly not by a long shot rid of the self-equal primordial state of matter. Here it is spoken of as the unity of matter and mechanical force, and this as a logical-real formula, etc. Hence, as soon as the unity of matter and mechanical force comes to an end, motion begins.

The logical-real formula is nothing but a lame attempt to make the Hegelian categories “in itself ” [An sich] and "for itself" [Für sich] usable in the philosophy of reality. With Hegel, “in itself ” covers the original identity of the hidden, undeveloped contradictions within a thing, a process or an idea, and “for itself ” contains the distinction and separation of these hidden elements and the starting-point of their conflict. We are therefore to think of the motionless primordial state as the unity of matter and mechanical force, and of the transition to movement as their separation and opposition. What we have gained by this is not any proof of the reality of that fantastic primordial state, but only the fact that it is possible to bring this state under the Hegelian category of “in itself”, and its equally fantastic termination under the category of “for itself”. Hegel help us!

Matter, Herr Dühring says, is the bearer of all reality; accordingly, there can be no mechanical force apart from matter. Mechanical force is furthermore a state of matter. In the original state, when nothing happened, matter and its state, mechanical force, were one. Afterwards, when something began to happen, this state must apparently have become different from matter. So we are to let ourselves be dismissed with these mystical phrases and with the assurance that the self-equal state was neither static nor dynamic, neither in equilibrium nor in motion. We still do not know where mechanical

force was in that state, and how we are to get from absolute immobility to motion without an impulse from outside, that is, without God.

The materialists before Herr Dühring spoke of matter and motion. He reduces motion to mechanical force as its supposed basic form, and thereby makes it impossible for himself to understand the real connection between matter and motion, which moreover was also unclear to all former materialists. And yet it is simple enough. Motion is the mode of existence of matter. Never anywhere has there been matter without motion, nor can there be. Motion in cosmic space, mechanical motion of smaller masses on the various celestial bodies, the vibration of molecules as heat or as electrical or magnetic currents, chemical disintegration and combination, organic life — at each given moment each individual atom of matter in the world is in one or other of these forms of motion, or in several forms at once. All rest, all equilibrium, is only relative, only has meaning in relation to one or other definite form of motion. On the earth, for example, a body may be in mechanical equilibrium, may be mechanically at rest; but this in no way prevents it from participating in the motion of the earth and in that of the whole solar system, just as little as it prevents its most minute physical particles from carrying out the vibrations determined by its temperature, or its atoms from passing through a chemical process. Matter without motion is just as inconceivable as motion without matter. Motion is therefore as uncreatable and indestructible as matter itself; as the older philosophy (Descartes) expressed it, the quantity of motion existing in the world is always the same. Motion therefore cannot be created; it can only be transferred. When motion is transferred from one body to another, it may be regarded, in so far as it transfers itself, is active, as the- cause of motion, in so far as the latter is transferred, is passive. We call this active motion force, and the passive, the manifestation of force. Hence it is as clear

as daylight that a force is as great as its manifestation, because in fact the same motion takes place in both.

A motionless state of matter is therefore one of the most empty and nonsensical of ideas — a “delirious fantasy” of the purest water. In order to arrive at such an idea it is necessary to conceive the relative mechanical equilibrium, a state in which a body on the earth may be, as absolute rest, and then to extend this equilibrium over the whole universe. This is certainly made easier if universal motion is reduced to purely mechanical force. And the restriction of motion to purely mechanical force has the further advantage that a force can be conceived as at rest, as tied up, and therefore for the moment inoperative. For if, as is very often the case, the transfer of a motion is a somewhat complex process containing a number of intermediate links, it is possible to postpone the actual transmission to any moment desired by omitting the last link in the chain. This is the case, for instance, if a man loads a gun and postpones the moment when, by the pulling of the trigger, the discharge, the transfer of the motion set free by the combustion of the powder, takes place. It is therefore possible to imagine that during its motionless, self-equal state, matter was loaded with force, and this, if anything at all, seems to be what Herr Dühring understands by the unity of matter and mechanical force. This conception is nonsensical, because it transfers to the entire universe a state as absolute, which by its nature is relative and therefore can only affect a part of matter at any one time. Even if we overlook this point, the difficulty still remains: first, how did the world come to be loaded, since nowadays guns do not load themselves; and second, whose finger was it then that pulled the trigger? We may turn and twist as much as we like, but under Herr Dühring's guidance we always come back again to — the finger of God.

From astronomy our philosopher of reality passes on to mechanics and physics, and voices the lament that the mechanical theory of heat has not, in the generation since its

discovery, been materially advanced beyond the point to which Robert Mayer had himself developed it, bit by bit. Apart from this, the whole business is still very obscure; we must “always remember that in the states of motion of matter, static relations are also present, and that these latter are not measurable by the mechanical work ... if previously we described nature as a great worker, and if we now construe this expression strictly, we must furthermore add that the self-equal states and static relations do not represent mechanical work. So once again we miss the bridge from the static to the dynamic, and if so-called latent heat has up to now remained a stumbling-block for the theory, we must recognise a defect in this too, which can least be denied in its cosmic applications”

This whole oracular discourse is once again nothing but the outpouring of a bad conscience, which is very well aware that with its creation of motion out of absolute immobility it got irretrievably stuck in the mud, but is nevertheless ashamed to appeal to the only possible saviour, namely, the creator of heaven and earth. If the bridge from the static to the dynamic, from equilibrium to motion, cannot be found even in mechanics, including the mechanics of heat, under what obligations is Herr Dühring to find the bridge from his motionless state to motion? That would be a fortunate way for him to get out of his plight.

Space and Beyond: Posadas and Other Otherworldly Thinkers

“Orbiting Earth in the spaceship, I saw how beautiful our planet is. People, let us preserve and increase this beauty, not destroy it!”

-Yuri Gagarin

Flying saucers and the socialist future of mankind by J. Posadas

Life can exist on other planets, in other solar systems, in other galaxies and universes.

The passage of matter from the inorganic to the organic state could take place in a different manner to how it does on Earth, such that energy could be used in a more effective manner. Here, we barely know how to make best use of the oil and, in a very limited fashion, nuclear energy that we have at hand. They, on the contrary, may be on the way to exploiting all the energy existing in matter. They can use all the energy that we still do not know how to employ on Earth, and transform it into light. It could be that matter is organised differently in other planetary systems or galaxies, in infinite combinations and in totally different forms to those that we know on Earth. We cannot imagine what it is like, but we can imagine very well that there may be an organisation of energy infinitely superior to what we have here. In the Soviet Union, they have discovered a ray infinitely faster than light, which is something totally new.

This same ray may have been discovered on other planets millions of years ago, and already been used. While we take X amount of time to get from one continent to another, they perhaps do it in a half-second. The conception of life and the organisation of matter are determined by all such things. This energy must contain a property and force infinitely superior to anything we know. We can conceive of a being which, just by raising its hand, can produce light, draw energy to it, push it away, and organise it. It is possible. We are habituated to seeing and conceiving of life on Earth, in the commercial sense of private property, the feeling of possession, which is the basis of social development before the coming of the workers' state. It is this that determines the purpose of life and its relation with other planets. When they plan a journey to another planet, they do so in order to see how to exploit and dominate it, because science is subjected to those who pay for it. Science is not independent.

It is not the same thing as when you plant a plant, to reap what you want from this. In this case, even if we are subject to nature, we determine what happens. Science, on the contrary, is subject to those who finance it. Astronomers, physicists, where should they go to find the equipment for their research? They cannot do so, without money. They are not, as individuals, rich enough to pay for these things and also get by. It is the capitalist state, or indeed the Soviet state, that has the means to pay. They can thus install their equipment, but they limit their capacities to capitalist interests or the bureaucratic limitations imposed by the leadership of the workers' state. That is why our knowledge of physics, of matter, of astronomy is still at only an embryonic stage. We still have no real knowledge of what exists. We constantly correct the very basis of discoveries, whether for Newton, Einstein or all the others. The forms and combinations of matter are infinite. There are forces within it that we do not utilise. We must discover the power of what it is possible to do. The force that allows us to raise our arms is called 'kinetic

energy'. Why this energy? What is it that impels the activity of the cells? There is no outside force. It is an internal movement. What is this force? The force that impels movement is a source of energy, which must have a primary form of development even before it lifts the arm, because there already exists the capacity that allows us to conceive, in our spirits, of the need to raising our arms.

One Japanese scholar advanced a conclusion, rather like our own, concerning earthquakes: he said that it was criminal to waste the energy made by these earthquakes. It is possible to make an system drilling into the Earth – like a sort of radar – measuring all the movements, the gases within the Earth, its interior shifts due to gas or to the rotations of the Sun and the Earth, of which scientists are still unaware. The Japanese scholar also said that we could predict, contain and, indeed, make use of this energy. We said the same thing at the time of the Chilean earthquake of 1961.

Scientific knowledge is still limited as regards understanding the organisation of matter that has permitted a certain form of life and reproduction on Earth. Our scientific capacity is limited as a result of the missed possibilities of such a study, as well as being limited by lack of financial means. It is the capitalists who have these means in hand. They have capitalist interests. This is a very significant limitation.

Moreover, our capacity and audacity for making further observations are limited by the conception of the world established by the appropriation and utilisation of property. Our knowledge is limited by particular interests and social prejudices. This is evidently the case, for example, as regards heart transplants. Capitalist mentalities prevent the bourgeoisie from having any perspective, impeding them from taking an interest in the

world and limiting their daring to observe it. If they had audacity and resolution, they would realise that they have gone awry and that their existence is no longer justified. Their interests limit and box them in. They place the same limits on science, chemistry and medicine. Conversely, there is no reason why this should be so on other planets.

The class struggle does not have to exist. On Earth, on the contrary, the process of history has played out like this. There is no reason why the same should be true of other planets. The organisation of society could take on infinitely superior forms, without struggle and antagonisms. There is no reason for fighting. If beings on other planets saw us, they would say, astonished: 'Oh! They are fighting over a car, shooting, killing each other!' For them, death does not exist. Here, it does. The notion of death, the extinction of matter or of cells is not the same everywhere. For elephants, life lasts 260 years. For human beings, 100 (and on average 70-80). If the elephant can live for 260 years, it is because the organisation of matter, in this form, allows for such a long life. But why can we not imagine living as long, in a different form to the elephant? Without a trunk... why not? We do not know if beings exist in other systems or galaxies, nor how they are constituted.

But we believe that they could exist. It is possible that beings will come to study Earth, what life is like here, beings who departed their homes for Earth a million years ago. For us, that corresponds to a million years. But for them it is an insignificant figure, a normal amount. They may well not be subject to our notion of time. Time has always been and remains a notion picked up by a society divided into classes. Such a society needed to measure time in order to exploit nature. Hence this division of time.

Otherwise, there is no reason for its existence. Certainly, we have to deal with periods of time, weather and the seasons – spring, summer, autumn, winter. But there is no reason why there should be seasons on other planets. Why does it have to rain? This apart, time is of no significance. This interest in measuring time is relative to nature, to its effects on life, to the effect of energy on the organism and to due dates and billing. On other planets, there is no reason why this should be so. For example, no-one has to pay debts by a certain time or needs a heart transplant. A being on another planet who saw a heart-transplant operation would say ‘what is that they’re making?’ The notion that we have of the origin of life is something that we have learned.

But each year, corrections are made to it. For example, the date of the appearance of human beings on Earth: at first people spoke of 500,000 years ago, then a million years, and now that the first anthropoid appeared some 17 million years ago.

The dialectical conception of history

All the news of UFOs (unidentified flying objects) around the various parts of the world coincide. There are many coincidences, not all of which are exaggerations. We believe and accept that these beings exist. The majority of people who have seen them say that they are normal beings; and the people who speak of them say that they do not believe in ghosts or spirits. Many people have already seen UFOs. General MacArthur, that Yankee murderer, said with regard to the disappearance of a plane that had struck a strange object: ‘perhaps we – together with the Soviets – will have to make war against an enemy arriving from outside Earth’. But conciliation of this type has its limits. Capitalism has no interest in UFOs and, as such, makes no research into them. It has no

interest in occupying itself with these matters because they cannot reap profits, nor are they useful to capitalism. But people see in UFOs the possibility of advancement and progress. This thus accelerates the fall of the bourgeoisie, shown in all its uselessness. All the people who say that they have seen extra-terrestrials, UFOs, coincide in the fact that these beings have not frightened them, and that they have made themselves understood, without using an audible language, showing them that they mean no harm. They do not provoke a feeling of alarm, but of serenity. They create sensations of mellowness, suppleness, harmony, reassurance. They do not inspire any fear. They must give off a sense of security by their movements, by their facial demeanour, or in other ways. None among those who have seen them have said 'I was scared, they frightened me'. On the contrary, they awaken a pleasant sentiment, one of respect. They must emit some sort of rays that cause this sensation, if they do exist. None among those who have seen them has said that they were attacked. They have shown no interest in attacking, violating, stealing, possessing: they have come to observe.

Starting from the fact of the existence of extra-terrestrial beings, we can accept that UFOs also exist. We need to wait for further proof. It is possible that they have appeared, though it is also possible that there has been much fantasising, exaggeration or mystical deductions on the part of those who have seen them. But there is testimony from people who seem thoughtful. Neither the capitalist system nor the bureaucracy [in the workers' states] have an interest in researching this subject, because they cannot draw any commercial, political or military benefit from it. Socialism, on the contrary, does have an interest in this, and so too do the masses. Capitalism feels that it has been made to look inferior, faced with a system that it sees as superior. People draw the conclusion that capitalism is useless. They say 'Look at that! And you, what are you any good for?' The ruling class feels diminished. If it could draw a military gain from doing

so, it would conduct research. But capitalism tries, on the contrary, to spread the impression that this is fantasy, so people will not think that there are superior forms of relations and that capitalism is incapable of reaching this level. The workers' state will act in a different way, because it has an objective interest in developing socialism. But at all events, the facts are coming to light in spite of the smokescreens, because there have already been many testimonies. The capitalist ruling circles, the chemists, the military, are hiding the facts. But all the information still gets published – amidst all the current worry about war, revolutions, the preparation of the final settling of accounts between capitalism and the world revolution, the constant strikes in anger against the capitalist system, the occupations of factories, of universities, of land – because these questions preoccupy the whole world. In spite of all these other concerns, people are interested in UFOs.

We do not know what form they take, or their number, but they must exist, or else they would not appear like this. There are reasons enough why capitalists would not invent these matters. They could try to use them to distract attention. But all this runs against their interests. They could divert attention to a concrete fact. But they do nothing but increase peoples' certainty that the capitalists are no good. Besides, all this concern with UFOs does not stop strikes or factory occupations or revolutions, nor the progress towards socialism. The preoccupation with studying these phenomena has not yet developed in the workers' states, given people's concentration on getting by and because the bureaucracy is hiding these matters. It is, certainly, hiding a great amount of research that has taken place in the workers' states. People would see forms of existence superior to those we have today. Socialism, on the contrary, has no fear in being compared with or integrated into higher forms of progress.

On the contrary, it seeks out this progress. 'We have nothing to lose but our chains'. This phrase of Marx's can be applied to everything. Moreover, it is absurd that people are discussing the problems with UFOs while millions of others are dying of hunger. It is capitalism and the bureaucracy of the workers' states that have led to this prejudice that exists in the world. There are possibilities of exploiting matter that this society is incapable of employing. Capitalism, as well as the bureaucracy [in the workers' states], is aware of this inferiority. In the workers' states, there are researchers who do not measure things in terms of inferiority or superiority, but simply note that in other galaxies and planetary systems, in other universes, it is possible to fully utilise matter and eliminate all this concern with hunger and class struggle. It is possible to wipe the ruling classes out of existence. The system, there, is superior. The inhabitants of other planets who come here must consider the Earth's inhabitants as mad, always fighting one another. The notion of struggle, of confrontation, certainly does not exist where they come from. Why fight? The historical foundation of the capitalists' and workers' states' bureaucracies' lack of interest in studying UFOs and living beings on other planets is that they see the threat of their own elimination. As such they do not interest themselves with the continued existence, the life, of human beings.

Everything that is not of commercial use, or does not serve to facilitate the existence and perpetuation of capitalist power, does not interest them. But since society must live and the proletariat and socialism must advance, these things stimulate people in the capitalist system to concern themselves with the existence of beings on other planets. So too in the workers' states. The existence of flying saucers and living beings on other planets is a phenomena that the dialectical conception of history can admit. The most immediate consequence we can draw is that, if these beings do exist, they must have a societal

organisation superior to our own. Their appearances are not the effect of bellicose or aggressive sentiments.

This means that they have no need for war, that they do not come to Earth with goals of conquest in mind. In this planet's history, when a people has felt itself to be more capable and invaded another country, it did so with conquest in mind, in the form of war. The class struggle on Earth is the result of the organisation of society into classes, that of the possessors and that of the exploited, the bourgeoisie set against the proletariat which wants to overthrow it and build socialism. The behaviour of these beings, if it is true that they exist, seems not to be aggressive in character. All the people who say that they have seen them, say that none of them were of an aggressive disposition or inspired fear in them. All of them say that they awakened their curiosity. If these were beings from afar (as we have known in our planet's history) with swords, arquebuses, cannons, stones and rocks, with tools of conquest, they would inspire fear through their aggressive behaviour. But these beings come to observe, they try to make it understood that they intend no harm. Their behaviour expresses their superior organisation.

They have no aggressive impulse, they have no need to kill in order to live: they come only to observe. We can foresee the existence of such beings, even taking into account the fantasies that exist among the reports, stories, observations and statements. If they exist, we must call on them to intervene, to help us resolve the problems we have on Earth. The essential task is to suppress poverty, hunger, unemployment and war, to give everyone the means to live in dignity and to lay the bases for human fraternity. To this end, we must suppress the capitalist system, as well as the bureaucracy of the workers' states and Communist Parties who do not want to seize power. The fundamental obstacle

we face is the capitalist system. We must suppress the force currently in the hands of the capitalist system: nuclear weapons. Destroy all nuclear weapons. Destroy the whole military power of the capitalist system, of Yankee, French and British imperialism. Appeal to the masses and give them the means immediately to destroy capitalism, overcome the bureaucracy of the workers' states and establish a new society: socialism.

We must appeal to the beings on other planets, when they come here, to intervene and collaborate with Earth's inhabitants in suppressing poverty. We must make this call to them. It is possible to make ourselves understood to them. We must not, of course, expect that they will understand immediately. But we must make appeals to them, if we believe that they can, indeed, exist. If we have any possibility of making contact with them, we must not fall into individual scientific curiosity, out of some desire to see where they come from and to visit other planets.

We must unite with them, they who seem more powerful than human beings, such that they will come and help us resolve Earth's problems. Then we can concern ourselves with going to see what other planets are like, how life and matter are organised, and everything regarding nature. But most important is first to resolve the problems of humanity on Earth. We do not have a fantasist or idealist position with regard to flying saucers. As we accept that they exist, we want to use all means at hand, including those from outside of this planet. When we seriously reach a scientific discovery, we must try to use it to the benefit of humanity.

The infinite development of humanity's scientific capacity

The longest human life of which we know was 160 years in duration. We can keep our full mental faculties intact up to around 80 or 90 years of age. But an elephant, which lives for more than 260 years, has a much vaster memory. That means that the length of memory can be extended. Extra-terrestrial beings could do so for more than a million years. Have there not been over a million years of human existence? And it reproduces itself incessantly, without destroying itself, without its reproduction wiping it out. Matter, in the case of mankind, persists by means of reproducing itself. It does not disappear. Just one form of the organisation of matter – the form of human life – disappears. The matter transforms into something else and takes part in the transformation of something else.

On other planets, matter could transform itself without needing to destroy its state of existence, nor its constitution as a living being. It may well not have to be reduced to ashes in order to feed something else. What is the meaning of a seed? It is matter in a primary state, which stimulates other elements and is reproduced in another form. It may be the case that among other beings, there is no need for death for the sake of reproduction. We are not saying that this is so, but it is totally possible. Energy is still used in a very mechanical, limited and rudimentary fashion. Today, we make use of the transformation of matter into energy, but not the energy that already exists in a natural state. This must be done. For example, we could suppress all oil refining, necessary to the transformation of this matter into energy. One day, energy will come from the air. Electricity is part of the structure and behaviour of matter. We profit from this because we have discovered it. But all this is very limited. Tomorrow, electricity will not be necessary. Everything that exists is energy. The condition of existence of an object is that it has energy. The organisation of the human body, the brain and other organs and

senses, is that proper to Earth. On other planets it could be very different. We feed ourselves because the human organism is constituted in such a fashion as to make feeding ourselves necessary. This suits us partly for capitalism's sake, because otherwise there would be no reason to live in submission to this system. The scientific capacity of humanity is determined by societal organisation. The organisation of society in terms of private property is very limiting, because the élan, courage and audacity it allows for are determined by the interests of individual appropriation. Our audacity is thus very limited, because it stops as soon as this interest is satisfied. If the human being goes further than this, he has the feeling of having gone too far. This societal limitation constrains the capacity of society. In socialist society, society's capacity will be unlimited. The notion of life, existence, society, will be measured by the objective interests of life and progress. Existence and progress will be identified with one another. Notions of conservatism, parasitism, passivity, will no longer exist. Progress will be existence itself, as in the case of matter. Matter does not exist, if it does not progress and transform itself. The same is true for the life of society. It does not exist without progress. Society's condition of existence is progress. Immediately, progress will give élan to its capacity and to its audacity, which will be a million times greater than those of the private-property system. It will not be limited or determined by what suits individual interests. All society will be there to give confidence and reassurance. Common, society-wide thought will change the forms of life. For example, in the same time that we today need to reach the Moon, we will be able to travel distances of millions of light-years.

Today, we speak of millions of years. Tomorrow, the measure will not be the same. We will easily find ways of solving all the problems deriving from the notions of land, gravity, and atmospheric pressure. We will find a response to the essential problem: the capacity of society, organised as a single societal thought, will be able to resolve

everything. There will not be, as there are today, certain people who think, certain faculties, certain universities. Universities exist insofar as a division, a separation is made. They serve the exploitation of society for the sake of capitalist profits. That is what universities serve for. Tomorrow, we will have no need for them. Progress will be common amongst everyone: audacity facing up to nature. This question is important for a training in and knowledge of Marxism. Marxist knowledge is unlimited. It does not stop at the question of social, economic and political struggles. Understanding existence gives the assurance necessary for envisaging the solution of all problems. There is no problem beyond the remit of humanity. All the problems of humanity influence one another. The more we master knowledge of history, humanity, society and matter, the more confidence we can have in addressing problems with resolution and audacity.

Even without prior preparation and knowledge in a specific field, but scientifically prepared with Marxism as our tool, with dialectics, we can address all problems. This is the essential aspect. The other is socialist audacity, drawn precisely from the objectivity of Marxism. We are not subject to nor dependent on what exists now, nor what will come in future. We are objective and our thought has no limits. The only limit is the lack of human capacity to understand more. This human capacity is also a product of social relations. That is why in socialist society, human capacity and knowledge will be the norm for all of humanity. People will have a scientific capacity superior to Marx – which does not at all affect his historical importance.

The development of history has continued and today there exist conditions that did not exist in Marx's time. In the near future, scientific knowledge and society's confidence will develop the capacity of society. But we are not yet living out socialism. We are still

in this society. The critical spirit is an essential condition, inherent to Marxism, of its historical force, inexhaustible up to the point where there appear superior means of interpretation allowing us to understand the processes of nature. The dialectic will be one of its aspects. The critical spirit represents a constant feeling of the need for revision, analysis, observation, study, to see what effects and what conclusions arise from the development of nature and society. Marxism in itself is irreplaceable, because it is a method for understanding the history of the world.

Means of interpretation superior to Marxism will arise – not because Marxism is incorrect – but because humanity will reach some better understanding. The dialectic will be part of some superior tool. All these people who accept the existence of flying saucers do so without the impulse or the will to develop scientific understanding, but simply because they are obliged to recognise a real event for what it is. But they do not have the systematic spirit or the objectivity to make use of the understanding that they have, in the social terrain. For example, if life does exist on other planets, this means that there exist superior forms of social organisation, which do not oblige them to live as we do here, with wars. All those who accept the existence of flying saucers, have only reported them. Like someone projecting a light onto a wall and saying ‘this is a light’. They draw no conclusions.

We, on the contrary, take up these questions in order to contribute to understanding history and, consequently, to develop our audacity. The basis of historical audacity is certitude. The Vietnamese masses are a demonstration of this. It is Marxism that gives this confidence. It is very important to concern ourselves with these questions. Yet we do not have time. Certainly, we must give full attention to those problems we find before

us, without thus losing sight of other questions. We are not indifferent to these. We accept that extra-terrestrial beings exist, as a conclusion of dialectical thought. This gives us confidence that we can master no matter what other phenomena that exist, without being caught off-guard. These problems do not put the dialectical method into doubt.

On the contrary, they do but confirm it. This is confirmed on every occasion. We believe that extra-terrestrial beings may exist, as well as flying saucers. This also holds, basing ourselves on the knowledge we have thanks to dialectics, with regard to the organisation of matter. There is no reason, for example, that reproduction must always take place by means of couples. There may also be self-reproduction, as is the case for the amoeba.

Why could this not also be the case for humans, in future? These beings from other planets come to observe life down here and laugh at humans, we who fight each other over who has the most cannons, cars and wealth. The possession of wealth is a distortion of human feeling by societal organisation: instead, the human sentiment is a fraternal, collective one. Possessing wealth is a degeneration of these sentiments. Why does the bourgeois want twenty cars, a hundred factories, the rank of general – why? What does that give him? Power over others? And what then? ... It does not give him any capacity to raise and develop his intelligence. On the contrary, it limits it. The bourgeois class can have no interest in or perspective of seeking objectively to develop society. It is only concerned with material goods, from which it can draw profits, and thus the perpetuation and extension of private property. This limits its understanding and prevents it from thinking. Even if the information on flying saucers is fantasist – as it most often is – the historical basis for it is correct.

Neither capitalism nor the bureaucracy in the workers' states, nor any bourgeois thinker, can explain this. They are all at sea, overwhelmed. Those who could do so do not have the means, because they depend on the major scientific and research-institutions, which are themselves dependent on capitalism. It is necessary to try to understand these phenomena, not simply to increase our knowledge, but to extend the application of Marxism to all branches of knowledge. For example, thought. The speed of thought depends on the dominant material means. Thought is still very limited today. Tomorrow it will be infinitely more powerful, and quicker, too. When the class-struggle has been eliminated and harmony is a necessity of life, thought will have a field of operation and possibilities of development infinitely superior to those that exist today. Today, thought is very limited, from infancy onwards. To draw deeper conclusions on these questions, we must follow them attentively, interest ourselves with them, discuss them, learn about and study them. Other phenomena like that of UFOs will present themselves. A whole series of things will attract our attention. Is the development of matter in another universe similar to that here?

If it is different, what form will it take? The utilisation of matter must, certainly, take place at a superior level. Organisms are not created arbitrarily, but according to certain compositions and relations internal to matter. The organism is structured starting from inorganic matter, then taking on an organic form, and then in function of the environment in which it evolves. These beings coming from other planets with a structure similar to mankind may well originate from a process of the organisation of matter similar to that on Earth. They may also have used matter in order to take on this form. They could do so if they have mastered science, just as here we could move mountains. Mao Zedong says that we must do this with a pickaxe and a spade. But those

beings do so by means of putting the mountain's energy into action. It is possible. But it is not a problem we can resolve just now. We do not have the times or the means.

Already, we can reproduce life. Certainly, this must also be true of other planets. These beings can do that. Here, we transplant hearts and kidneys, fundamental organs of the human body. But it is possible that on other planets they create life. Engels told us that already in his time it was possible to produce artificial protoplasm, this being an essential basis of the cell, and thus a basis for existence. The discussion of these questions will soon become more generalised, because it makes for the progress of humanity in its integration with nature and the universe.

On The Socialist Future of Humanity By J. Posadas

For humanity in the future, geometry will be one of the most beautiful and constant companions. Art will grow wings and creativity will make connections with the cosmos. In so many years time, when this happens, the act of creation will be simpler than now. The obstacles that disengage the Artist from his or her capacity to imagine will have been swept away.

At present, artistic creation relates to the special qualities of the human beings as they are today - and their human relations. What inspires us today is our human condition, but tomorrow, we will find inspiration in our relationship with nature and the cosmos! In the future, our capacity to imagine will resemble that of the Romulo Gallegos, the poet, who says:

“.... I see, although I am not looking,
I hear with no need to listen ...”

When we achieve this, Art in the form we know it will have changed. Perhaps it will not be what we call ‘Art’ any more. There is no knowing whether it will still be called ‘Art’. Art reflects the history of human imagination. This shows very well in poetry. Take the image of the poet, with a far-away look, gazing into space and thinking: Is that not a representation of our longing for the cosmos? From where we stand today, we can only intuit the reality of the cosmos. We grasp very little of it, but we greatly yearn for it. Everything we do remotely creative has a cosmic grain in it.

Musical notes come from the sounds of the world. They are superior to sounds, but they originate from sound. Sound being a movement. The musical note organizes the

movement of sound. Humans derive music from the all sounds/that abound/all around. The musical note is the language of intelligence. Intelligence speaks wherever there is poetry, music and song. Colour is part of it. We love colours because we come from colour. Colour and sound. Noise comes first. But in the human being, noise soon becomes sound, and sound soon becomes the musical note. The musical note is sound upgraded. The booms and rumbles of nature evoke strong feelings, and the human imagination refracts these musically. See how music touches even the animals, the domesticated ones particularly. Over the millions and millions of years, the animals too have developed some ability in this respect. Some animals close to people respond to music, although music-making is strictly human. It is us, the human beings, who have brought music out of sound. All that which we call 'science' and 'art' summarises the social development of the human relations: Although we have entered the epoch of our relations with nature and with Outer Space, the relations between us, humans, was the first determinant. For example, take the most elevated intelligence - that of Marx: Even it has depended on the human relations. Every grain of human intelligence that you observe in one place gives a world reading of the level reached by the human relations overall. This remains true where human intelligence happens to be expressed only in one country, or only in one locality.

Foresight: Human intelligence stops at no boundary, not even that constituted by the human relations that gave birth to it. Intelligence sees through what stands before it. It has the ability to surmise, infer and foresee. It detects objects beyond those that are visible, and makes relations with them. Mathematics, physics, chemistry are examples. Only, in the case of Art, a great deal more imagination, feelings and sentiments is involved. Sentiments are pivotal in Art, because imagination is intimately tied to the ability to feel.

There is no complete identity between human sensibility and its expression in the form of Art (poetry included). But this gap is narrowing. The day is coming when this gap will close, and these two things will be one. Why are sentiments so divided from creativity? Why is there today such a division between what people intend to do and what they actually do? This separation will end. Although 'intention' and 'behaviour' will always be separate, time will come when they will espouse each other. Today, the deeds of the human beings are divided from their feelings. Of course, this is the effect of the class struggle. But humanity is working very hard at its reunification in this field. When it finally succeeds, its intelligence will be truly unbeatable, in depth and in breadth. We say 'in depth' because human hindsight will gain a dominion of its vast history; and we say 'in breadth' because human foresight will peer into the millions of years ahead. Intelligence is certain to do this! At last the obstacle will have been removed that used to stop humanity walking as big and tall as its intelligence. The humans of the future will be paragons of selfconfidence. There will be nothing to stop them - not even living twice as long if they wish - and still improving their relationship with nature at every turn. When the humans are at one with nature and the universe, the lifespan of individuals will treble whilst the density of their lives will continue to increase. In fifty or one hundred year time, we should see attempts at perennial life. We have all the elements required. The hope of becoming eternal may be asking a little too much, but why shouldn't we try? What we can say so far is that we are going to live much longer in the future. The squandering of life that goes on at the present moment is quite staggering. The way to put an end to this terrible waste is to put our social house in order. When we have done this, we will be ready for our physical link with the universe. What is the human being? The human being is what the universe has achieved here on earth. Life on earth is the universe in an earthy form. Who says that we must necessarily leave this earth to get to the universe? It could be that there is a very direct

way of contacting the universe. After all, what is intelligence if not just that? As we have seen with music, the sounds of the cosmos are linked to human intelligence where they resonate. We have seen how the sounds of space created the bases for the musical note. But we do not say that human intelligence comes from the cosmos! Human intelligence is the result of human relations here on earth. It stems from the social organisation between the human beings, here on earth. Without social organisation, music would not have arisen! It is through our human relations that the musical note has evolved from where it started, in sounds, in the noises of the universe. It is the relations between the humans on earth that have done this! And the musical note - with its cosmic origins – is only one part of the language of the human sentiments. Considering this to be our history, why shouldn't our growing ability to feel, hence our sentiments, enjoin our intelligent mind to turn decidedly towards the cosmos? In the process that caused humanity to turn mere sounds into music, not just our sentiments were involved, but our intelligence too. Humanity has never stopped doing this, it does it every day. Those who do it best are those who put all their sentiments and intelligence at the service of social progress and improvement. When it is fully backed by the human sentiment, human intelligence becomes highly able to serve and influence the progress of humanity. What is 'progress'? How is it measured? Not through neon-lights and luxury cars, certainly. We measure it through its increasing longing for the cosmos. Soon, in some 50 years-time or so, we should humanity doing this. Our human voice is going to be mightier than the mightiest thunderclap. The vocal cords are going to modify – we say modify, not change. We our human voice, we are going to convey the extraordinary preciousness of existence. The musical note may help along, but we are going to say it all with the human voice. The day will come when the human voice will be said to have fulfilled a role comparable to that of Karl Marx. This will happen when human dispute, in all its aspects, has been eradicated. When we have finally kicked out dispute, persuasion will

enter like the sound of music. Tomorrow, music will be a voice and a language. In time, the musical notes - for all their majesty - are going to be superseded by language, manners of speaking and manners of moving. Each human movement is going to be intelligence at work. Understanding, experience and human ability will have undergone a process of concentration. Not a synthesis, a concentration. In some 500 years, all the computers of the world will be inferior to the smallest part of our brain. No press-buttons, a glance. A simple glance will see into the millions of years ahead, and the millions of years behind. Beyond the enormous ability this is going to give us, we are going to be able to foretell the consequences of all the various and possible lines of action, making our capacity to foresee quite inexhaustible. Once wars and disasters have been vanquished, we are going to be able to see clearly and straight into the vast expanses of our uninterrupted progress. Marxism itself is going to be superseded. As Trotsky explained, dialectical materialism is going to form the base of yet superior methods. Marxism is only the best we know at the moment. With the knowledge of tomorrow, and tomorrow's superior social life, dialectics will no longer be the language but the alphabet of progress. A different alphabet from what we know as 'dialectics' now. An alphabet with no end or beginning. The one that never started, just only developed. The existence of the Soviet Union forms part of the reunification of humanity. To deny this is a crime. Not a personal crime, a historic crime. The Soviet Union is the tool of history. To oppose it is like opposing the wheel. There are such people still. They want the USSR dead because it is winning. We are told similar stupidities in support of the need for 'free trade unions in Poland'. But those who speak of such freedom defend their own interests, not those of Communism! They have no idea of history. Had they lived at the time of Archimedes, they would have condemned him for splashing them with dirty water when he came out of the bath shouting 'Eureka'. The subjective and individual view of history is like this. Just consider, for a moment, the achievements of the Greeks, in part of the Egyptians, the

Assyrians and the Sumerians. They left us precious proofs of their objectivity in scientific investigation. 'Objective' means that they chose to explain the human being as part of nature and the universe. The stones of Stonehenge tell us that; those of the Indigenous peoples of Colombia also. The main drive of private property is to limit the scope, the development and the dynamic of intelligence. The interest of private property causes it to counteract and cripple anything that develops ideas. Inspect any epoch you please: There, you see private property at war with any idea that threatens to deviate, go further or surpass private property. Individually, as in boss vs worker, or as a class, capitalism vs proletariat. Socialism is all to the reverse. The elementary condition of socialism is to make every scrap of objective knowledge serve the common good, the good of humanity. Socialism does not serve the socialists and the communists. It serves humanity, and this, through Marxism as the interpreter of the common good. We are still in the period where humankind needs Marxism to interpret. Marxism interprets human conduct as it has been up to now. It interprets how human conduct has been shaped, over thousands of years, by the fundamental and decisive factors of existence, property and human relations. Marxism summarises all these factors. It is not a bible of course, but a means to interpret human conduct. Human conduct is not what changes. It is the human being that does, along with the progress of society. As it develops, human conduct becomes more detached and less dependent on sex, on war, on property, on man versus woman. Time passing, human sentiments tend to fill a bigger space in the realm of human conduct. The growth of self-confidence in people is a historic basis for socialism. Self-confidence lets the humans face the question: "Isn't stupid to fight as we do?" and: "Do we have to keep killing as we do?" Egoism is induced by the exclusiveness of private property. It does not throttle the maternal and human sentiments, but that is only because life creates these and imposes them. Human love and private property are poles apart. There is no human love in any part of private property. Love, as a sentiment,

comes from the feeling of belonging to life in all its animal and natural forms. Human relations and intelligence have intertwined into music. There is no music where the sentiments oppose life. Society has developed in a way that has led to classes, but the advent of the working class announces the end of social classes. The working class is not yet at the stage when it can determine freely the course of life. Even then, however, it has acquired a very great importance. This means that humanity is mature. It is ready for socialism. If the proletariat has not exercised a greater influence over the world so far because it needs leaderships to do so. The stage of Stalin has signified a great step backwards from the immense progress that history had made through the Bolsheviks. But humanity is fighting back and will reach that level again. In the Polisario (fighting for freedom from Morocco in the Sahara), in Ethiopia, in Cuba or Vietnam - all sorts of categories of humankind can be found. Yet they are all wanting socialism. They prove that humanity is ready, and apt, for socialism. What defeats capitalism, oppression and war in the end? The necessity for human progress does it. What is missing now is the instrument of progress, and that instrument is Marxism. The Party is missing. The Party is the actor that needs the Marxist tool in order to get on with the socialist task.

Childbearing in space, the confidence of humanity, and Socialism

By J. Posadas

The Soviets are setting out to experiment with the gestation of a child in space. This could be one of the forms that love will take in the future. It marks a very important step in the field of reproduction and in the field of science. Only a Workers State can actually do this. This initiative proves that the Soviet Workers State is not strictly determined by bureaucracy, for all the bureaucracy which it has. The bureaucracy still moves the tail-end of the Workers State, but not its limbs. Having now justified its existence, and demonstrated its superiority, the Workers State moves its own limbs. The superiority of the Workers State is no longer confined to its economic form. A stage has come in human development where the social relation takes over from the determinisms of the economy.

Very important matters such as childbearing in Space are already being debated. This is not done in a programmed way, but initiatives like that of trying to create a child in space pose the need for programmed debates. This experiment is going permit new observations in the field of biology and in the field of reproduction on Earth and in space. See how the human spirit projects itself hundreds of millions of kilometres outwards. Gone has the fear of space, the awe of distance, the idea of vacuum! It is not from the optical point of view that the ability to see has progressed over time, but from the social point of view. It is true that we can see today thousands of

kilometres away with new instruments and better mathematics. The true vision, however, is that of Marx: Marx who saw that capitalism would be destroyed.

A similar vision stands behind the wish to procreate in space. This wish can only arise in a Workers State when humanity has already reached a high degree of social selfconfidence.

If this were not the case, you would hear nothing of this; you would simply observe a people wanting to live better, cohabit better - and defend itself better. Instead of this, you see the Soviet leaders envisaging this experiment. It is the Workers State that inspires them to do so, because this kind of initiative pushes against the bureaucratic restrictions put the way by the Workers State having to coexist with capitalism.

The notion of creating a child in space is consistent with the experience that the Soviets are making in Siberia where they build towns in temperatures of 60°C below zero. Isn't this a proof of great audacity and human confidence? The pioneers of Siberia see no problem with life - only with social class. Indeed social class is our last problem, and it is going to be resolved by liquidating capitalism.

Humanity has become absolutely certain that the human relations must be based on human love. The intention behind the Soviets' experiments has a profoundly human character. It is capitalism, on the other hand, that experiments in laboratories to see how better to sell goods, eliminate human beings and dispatch the proletariat. Capitalism would wipe out most of the proletariat, if it could, because it has no more use for

surpluses of manpower. Once again it would hurl one mass of proletarians against the other, if it thought it could get away with it. Even the church clashes with capitalism because the church wants people alive and capitalism wants them eliminated.

The forms under which human love ends up being expressed are not governed by sex relations. They are governed by the objective love for humanity; that is to say love for humankind as an integral part of nature and of the universe.

Much time elapsed before this level of consciousness could be reached. With the rise of private property, people developed the fear of shortage, and this fear created egoism.

The lack of food in sufficient quantity and for everybody provokes the sentiments of egoism, possession and envy. It is not true that these sentiments are innate. The church says that they are, but the upholding of this falsehood is not even in its interests, for how come god created such a being? You see the stamp of private property on every church notion, like the devil and hell.

The historic process advances through forms straining towards Socialism. They do not follow the pattern of local or partial needs, but that of a logical movement which itself responds to the logical necessity of humanity. Humanity feels pressed and oppressed by the straightjacket that imprisons science. For science is oppressed! The capitalists oppress science by using it to kill people. When science is liberated – it will not be long, in only a few years – we will wipe out all the problems, floods, hunger and misery. All this could already be done, and it will not be long before we do. And when we do, everyone will be an architect, an engineer, a doctor, and the like.

The Soviets' idea of childbearing in space is a rich one. It will bring new measurements in the fields of procreation and birth so far from Earth, and it will tighten our relationship with the universe. This audacious project shows that humanity already embraces the idea of less dependency upon the Earth and improved relations with other worlds. No society composed of classes or led by bureaucrats will carry this out, because only the harmony of Socialism can do it. The point we are at was not reached through calculations and programmes, but through the actions of the whole of society. The economy and science developed within the production methods of systems steadily concentrating and centralising. Every passing day sees all these factors more narrowly dependent upon mathematics, programmes and electronic brains. So much so that the human being can only wonder at the absurdity of having to live as we do, just to work, just to survive, just to make wars; the absurdity of living in conditions where the idea of being useful to nature needs not enter. Such conclusions must be drawn from the Soviets' disposition to create a child in space. It shows that humanity is secure. Secure in the notion that every problem can be solved, absolutely! And easily!

The consciousness of humanity could only reach this peak because the proletariat is the class, the only class in history that can think as humankind. The historic future of the proletariat is not as a proletariat, but as humankind. The proletariat can only develop further as a class by disappearing as class. Such is the Permanent Revolution today. In fulfilling the superior phase of its development, the proletariat must disappear, which is the construction of the new society.

It is important to win strikes and wars, but it is still more important to build the new society. This is where the historic role of the proletariat enters. As it grows in its class role – through its own way of thinking and programming – the proletariat communicates to the economy, society and science its preoccupation for the universalisation of human kind. Observe how the proletariat grows in the disposition to think in the name of humanity, and not just as a class. This is what it started doing when it built the Soviet Union.

Proletarian internationalism must not be seen as an aim in itself but as a start in the process of the universalisation of humankind. Proletarian internationalism helps to spread worldwide the logical and necessary objective of human progress. Its other facet consists in intervening directly to help others struggle and win; but is this not what one does, really, when one sends a rocket to Mars? What is the difference between boosting a rocket towards Mars and boosting the winning ability of Mozambique, Angola and Ethiopia? One impulse goes towards Angola and the other goes towards Mars; two separate initiatives, but one single objective; two separate modes of organisation, but one single aim. Tomorrow, all the different human initiatives and modes of organisation will fuse in the common objective.

In the future, the technical means will be a thousand times superior to what they are today. We are going to find electronic means, or equivalent, capable of sending and receiving not only human thought, but the specific weight of each thought.

The number of those employed in today's military HQs keeps dwindling. Where

thousands used to be involved, you may find only 15 now. The aim is war and massacre, of course. But it demonstrates that it is not necessary to work as brutally as we do today. If we have already the audacity to envisage childbearing in space, it is because we feel part of a quest that transcends life on Earth.

The Workers State has no need to reproduce or expand capital. Those who feel sorry for “the poor little Czechoslovakia” are very mistaken. If the Soviet Workers State had an interest in reproducing and accumulating capital, it would act accordingly in Czechoslovakia. But it doesn't act in that way. Far from it, it supports the revolutions in the world, and it seeks the liberation of humankind. It is capitalism that constantly suppresses and crushes people, again and again, in order to live. The need of the Workers State, on the other hand, is to eliminate every form of oppression.

Destiny, Freedom and Responsibility

From: Dialectical Materialism by Alexander Spirkin

The idea of destiny and necessity. Everything in the world is conditioned and takes place according to necessity. When we consider not merely objective events that occur in the world but also conscious human activity, the problem of necessity reveals itself in a new aspect: by becoming aware of it we turn necessity into freedom. The thinkers of the ancient world pondered the question of who governed the universe— the gods or destiny? Was the world ruled by reason or by blind necessity? According to Heraclitus, everything depended on destiny, and destiny meant necessity. The essence of destiny was reason, which guided everything.

At first destiny was regarded not as a universal abstract necessity but as the fate of individual mortals. Everyone had his own particular fate. Necessity was thus broken down into a large number of fatal forces, sometimes embodied in various creatures such as the oracle, the sorceress, the magician, and so on. Sometimes these forces of destiny came into conflict with each other.

Fatalism is based on the assumption that everything in the world and in people's lives is predetermined by natural or supernatural forces, that there is a rational being which sets the goal for everything that happens in nature, and that this being is called god. Everything in the world is predestined and no one is responsible for what happens.

Fatalism has a crushing effect on the individual. In human nature he sees a repulsive sameness, in human relations an irresistible force that belongs to everything in general and to no one in particular. The individual is merely driftwood on the waves. It is ridiculous to fight against the relentless law of fate. At best one may discover what it is, but even then one can only obey. Destiny leads the person who follows voluntarily, and those who resist are dragged by force. Freedom, according to the fatalist, is no more than the will of the horse, whose harness allows it to move only in one direction and in the framework of the shafts. Fatalism links up with religion, which asserts divine predestination. Both fatalism and religion grant human beings only a predestined role along with the illusion that they are acting independently. In any event the fatalist sees only a manifestation of necessity. Absolute surrender is what is expected of every individual in the face of imminent death.

Not only the religious idealist philosophers and superstitious people generally, proceeding from the idea that we can't get away from fate, adopt the standpoint of fatalism. It is also held by some philosophers who, as materialists, are opposed to religion and idealism, but believe that everything that happens in the world is predetermined by the "iron chain of cause and effect". Spinoza, for instance, maintained that people were mistaken in believing themselves free because they were only aware of their actions but did not know what causes determined them.

In contrast to religious fatalism, Holbach developed the conception of materialistic fatalism. All events were predetermined, not by the divine will but by the relentless sequence of cause and effect, a chain from which not a single link could be eliminated. Necessity commanded not only the physical world but also the world of the mind,

wherein consequently everything was also subordinate to fate. Although this mechanistic conception differs from the religious in that it makes its appeal to the natural and not to the supernatural, the two coincide in their general principle. In both philosophies man is doomed to obedience, in one case, to the will of God, in the other, to the immutable laws of nature. Primitive society presupposes the complete identity of freedom and non-freedom for its members, none of whom are yet capable of separating their inner being from that of the tribe. Human actions are thought of as the expression of the will of supernatural forces, as the inevitable blind and capricious power of destiny, which man must obey just as he obeys the life cycle of his organism (blood circulation, breathing, etc.) and the compelling force of instinct.

As classes and states arise, the concept of freedom gradually becomes contrasted to necessity. In ancient Greece, for instance, a person's inner and outward life was determined by his status in the social system which he inherited in the same way as his natural "gifts". Fate did not come to a person from outside but unfolded like a scroll out of his very essence. It was the expression of his character. No matter how tragic their fate, people could not, in principle, desire another because this would mean becoming someone else. The characters in Greek tragedy are carved out of marble, as it were. For example, in the works of Aeschylus all the actions of Oedipus are programmed by fate long before his birth. Even the gods themselves obey fate. According to legend; the Pythian of Delphi proclaimed that even the gods could not avoid what was preordained by fate. No one knew the intentions of fate except the three fateful sisters, Clotho, Lachesis and Atropos. Clotho held the distaff of inevitability on which the thread of life was spun. Lachesis turned the spindle and decided the actions and events of life. Atropos held the scissors to cut the thread of life.

Although fate was thought of as something unknowable and absolutely mysterious, people sought to discern its intentions by turning to the oracles.

It was believed that fate could not be understood by means of causal explanation and could reveal its secrets only to the unconscious. The divinity, according to Plato, made prophecy the province of the irrational principle in human nature. The voice of fate could be heard in thunder and lightning, in the flight of birds and the rustle of leaves. Later fate came to be identified with coincidence, chance, something that could not be controlled. A person expected to receive not what was assigned to him by the objective logic of events, but what came his way in the course of the game. Circumstances could make a beggar into a king, or a king into a beggar. The destiny of whole nations was sometimes dependent on petty court intrigues. The only consolation and hope lay in the fact that fate could be regarded as "lucky chance", as a goddess who could be prevailed upon to act in one's favour. Later fate came to be seen as an all-embracing and inavertible determinacy, alienated from human life and assuming its own continuity and necessity—destiny. Man was thus divided, as it were, into what he was in himself and what he was fated to be. On the one hand, duty as the expression of a person's social mission and, on the other, his personal feelings and interests acted as forces operating in different directions and fighting to control the behaviour of the individual. Now one side, now the other was victorious, depending on a person's inner nature and on external circumstances. The resulting conflict permeated the whole history of humankind.

The Christian world-view condemns fatalism. It presupposes faith in divine providence, which leaves room for free expression of the individual will. Confronted by divine omnipotence, fate has to retreat from the sphere of mythology and philosophical

disputes to the world of ordinary everyday notions. The religiously oriented conscience, dominated by fear of divine retribution, is opposed to the concept of fate. Everything of importance in human life must therefore proceed outside its influence. However, the idea of fate does not disappear. It is kept alive by the prestige of astrology, the principle of man's being part of the picture of the universe, whose forces determine the logic of human life. This form of belief in fate assumes that a person is born under a certain star and thus receives a certain programme in life, including even his personal qualities.

With the spread of the idea of historical progress and hope of the revolutionary transformation of social life, the concept of fate was defeated in its main citadel, a defeat that is expressed in both philosophical writings and belles lettres. Shakespeare's Hamlet fights to determine his line of conduct amid "the slings and arrows of misfortune". But the principles of the largely irrational life of bourgeois society continue to foster the idea of fate, particularly in social relations. Many bourgeois political leaders, including Napoleon, the "man of destiny", believed that politics were pure fate, understood as the play of chance defying reason. Goethe referred to a mysterious force that everyone felt but which no philosopher had the power to explain.

By studying the symbols of astrology Goethe tried to get back to the ancient conception of fate as something immanent in all living things, the irrational life programme. According to Nietzsche, man's selfhood is, in fact, fate. Spengler thought the idea of fate implied active rejection of individual conscience and good will and scorned all belief in human free will. Fate was the equivalent of such concepts as "life", "development", and "time". The idea of fate thus became symbolic of the pessimistic demand for activity at

all costs. Though such activity was bound to be futile, people had to do something all the same.

By one-sidedly stressing the role of heredity, the fatalist can maintain that everything we are is predetermined in the Inseminated ovum from which the organism develops, that the conditions of our life play hardly any role or perhaps none at all. From this fatalistic principle several practical conclusions are drawn. One can do nothing about inherited proclivities and diseases, because no one can change his ancestors. This gloomy view of the world found its ultimate expression in the ideology of fascism, which exploited the idea of fate as a weapon of arch-reactionary propaganda.

In recent years numerous works interpreting the problem of fate in various ways have appeared in the West. The neo-Thomists combine the idea of fate with that of god. Interpreting fate as a manifestation of an infinitely remote and mystically frightening divine will, the neo-Thomists urge us to submit to fate. In their view a person is in the power of supernatural forces that render him helpless. At times of happiness and strength, hope or inward contentment he feels he is achieving success, but this is really an illusion. Basically the essence of life lies in obedience, awareness of the futility and hopelessness of existence.

In scientific, realistically oriented thinking the idea of fate has no categorial meaning. The word is often used to denote an unfavourable or favourable set of circumstances beyond human control and planning. The word "fate" is also used among people who have no faith in any kind of destiny. In the ordinary consciousness it serves to express the idea of necessity, chance or a combination of the two. It is used, for example, when

we are talking of the law-governed result of development of certain events which are truly inevitable, although there is nothing mystical about this outcome. For example, we speak of a certain person's fate being decided in advance. The concept of fate is sometimes used to denote a person's path in life, not necessarily determined by any one person or thing but the outcome of a combination of the necessary, the accidental, the spontaneous, and the conscious in human life. By fate we may also mean a certain programme of behaviour determined by heredity, and by the features of temperament and character (wisdom or stupidity, restraint or hot-headedness) acquired during life. In folk wisdom this is expressed in the saying: sow a deed and reap a habit, sow a habit and reap a character, sow a character and reap a fate.

The problem of freedom. Stressing the complexity of the problem of freedom, Hegel wrote: "Of no idea can it be stated with such complete justification that it is vague, ambiguous, and capable of generating the greatest misunderstanding, and therefore liable to be misunderstood, as the idea of freedom, and no idea is discussed with so little understanding of its nature." Freedom is the key philosophical problem, the crown of all the efforts of theoretical thinking, the culminating moment of any mature philosophical system. There is nothing higher or more significant in any system of philosophical world-view or in the actual stream of human life. It encompasses the meaning of history and stands as the true criterion of social progress. The sacred word "freedom" has resounded throughout the centuries on the lips of the oppressed and is the guiding star of their social endeavours. For the sake of the triumph of freedom in the life of society, for the sake of the individual's right to self-expression and creativity, revolutionaries at all times and among all peoples have been ready to face deportation, the stake, the gallows, the guillotine. Guided by a profound social awareness, their hearts yearn for freedom in the name of the happiness of the poor and oppressed.

The entire system of connections between the individual, nature and society, all the demands that society makes on the individual and the individual's dependence on the world are in constant contradiction with the idea of free will. But this contradiction takes place in the framework of a unity—the unity of will and the real conditions for the manifestation of its freedom.

The actively creative nature of the human consciousness refuses to accept the purely mechanistic interpretation of people's dependence on external circumstances characteristic of the metaphysical materialism of the 18th century, which maintained that our life was a line that we were bound to follow across the face of the earth guided by external forces from whose control no man could deviate by a single step. If a person acted only under the influence of external forces, he would suffer the fate of Buridan's ass, which was unable to choose between two equidistant stacks of hay and therefore died of starvation.

Is a human being free in his choice of action or are his actions preordained by forces beyond his control and opposed to his will? If we say that man is free, how can we reconcile our answer with our acknowledgement of objective necessity? If we say he is not free, does this mean that people are only a means of realising the laws of social development? According to Kant, if human acts of will are empirically conditioned and necessary, no human being can be held responsible for them. That is why Kant maintains that there may be contradictions between freedom and necessity in one and the same human action. In pronouncing his final verdict on the human being, Kant states that although you, as a human being, acted thus because you could not act otherwise, your

actions being conditioned by circumstances and, consequently, you are not to blame, it does not matter whether, after all, you could or could not have acted otherwise—you are still guilty, since you should not have acted as you did.

Where, then, is personal initiative, the constructive, creative and transforming role that human beings are able to perform? The doctrine of non-freedom of the will, which belittles the dignity of man as a self-determinant active personality, absolves man of all responsibility for any crime or action and disentitles him of any reward for heroism. If everything is preordained, where is the fault of the criminal or the merit of the good man and the hero?

The thinkers who built the Christian world-view had to face up to this problem at an early stage. The problem of the relation between freedom and necessity was understood as a relation between freedom and grace, that is to say the freedom of man and the freedom of God. Here an antinomy arises that Christian theology since the days of Augustine has wrestle with. If we assume freedom of the human will, what are we to do about freedom of the divine will and vice versa? Unlimited freedom for man must limit the freedom of God, while assumption of the latter deprives man of free will. Augustine solved the contradiction by acknowledging only the human right to do evil (the idea of the Fall), while only God had the freedom to do good. Here we have the basis of Augustine's theory of predestination, which is, in effect, a theory of the freedom of a personal God. Man's good actions are performed by the grace of God; he is free only to commit sin.

According to Kant, the ability to initiate events independently (i. e., without compulsion) is freedom. Man has many roads before him and he can choose any one of them. But they all lie in the zone of activity of knowable natural and social laws.

The problem of freedom cannot be solved (although many attempt to do so) by discussing free will, understood as a mental phenomenon that is not determined in any way. Such a psychological statement of the problem of human freedom reveals a tendency to contrast metaphysically two independent kinds of phenomena: the material, which are causally conditioned, and the ideal, the mental, which are not objectively determined. Thus, freedom and necessity are not seen as being intrinsically related but are referred to different spheres of existence, that is to say, mental and material phenomena are dualistically counterposed and an impassable gap is set between them. Free will is associated with indeterminism and thus, in effect, identified with arbitrariness, with licence.

Psychologists define free will as the possibility of performing alternative actions in one and the same situation, as the ability to choose one of them and to rule out all the other possibilities. This is related to the struggle of motives, and the domination and victory of one particular motive. In other words, human freedom amounts to the possibility of deciding which line of conduct to take and which to reject. In this sense freedom assumes a meaning full of vital importance. According to Spinoza, we are in bondage to the extent that what happens to us is conditioned by external causes, and free to the extent that we act upon our own judgement.

Free will takes the form of purposeful and selective action based on conscious necessity. Thus, every free action is a unity of necessity and freedom. The concept of freedom is ambiguous. For example, an individual becomes free in the positive sense of the word when he acquires the opportunity to fulfil himself, to realise his essential powers. In the words of Marx, man "is free not through the negative power to avoid this or that but through the positive power to assert his true individuality".

Freedom is sometimes defined only in a negative sense, as personal independence, as the ability to say "no". However, every denial has to be made from certain, perhaps not fully conscious positions, implying a positive principle, which justifies a person's rejection of something and expresses the meaning and value of his rejection. Any rejection of one thing must imply an assertion of something else. Every struggle against one thing ultimately amounts to a struggle for something else. The significance of this struggle is determined by the goals it sets and the positions from which it is conducted. In this sense freedom is in direct contrast not to necessity, understood as determinacy, but to compulsion, to coercion, the use of force. But no coercion, even of the most violent nature, rules out the possibility of freedom, although it may severely restrict that possibility. The determinacy of freedom should not be confused and certainly not be identified with coercion. On the other hand, one should not separate intrinsic freedom as a psychological, personal phenomenon from external freedom, the moral from the political. The degree to which personal freedom is restricted by compulsion on the part of the ruling classes in a state based on exploitation has varied historically.

Freedom is a specifically human mode of existence and only that which is the realisation of freedom can be good in the human sense. One cannot live in society and be free of

society. Freedom, as understood by the Greek philosopher Diogenes, who lived in a tub to show his independence of society, denotes the breaking of all human and social ties with the world and thus implies only an abstract symbol of freedom. Such freedom indicates either a withdrawal from life or a complete opposing of oneself to social standards on the principle "everything is permissible". However, there is no action that does not in some way affect another person, there are no completely isolated human beings. The person who alienates himself from the community does harm to that community. The individual is not free always to act as he sees fit. He must coordinate his actions with those of the people around him. It is his responsibility to correlate his behaviour with their interests and activities. He is compelled to suppress some of his feelings and impulses and channel them in different directions from what he may have wished. These channels are determined by historically formed social standards, which in relation to the individual have objective reality.

When speaking of freedom, one should not think of it as doing anything one likes. Such "freedom" simply does not exist. Human actions are restricted by various factors, legal, moral, aesthetic, and by various traits of character, natural abilities, and so on.

According to Sartre, freedom is autonomy of choice. It is realised where a person initiates his own desires, chooses on his own behalf, on behalf of his Self. A girl wishing to become a singer discovers that she lacks the necessary gifts, so she becomes a teacher instead and her choice turns out to be a good one. Her personality, her character played a part in this choice. A person's decisions are also determined by external factors, and to an even greater degree by the whole make-up of his personality. For example, an honest person acts on principle and we say that he could not act otherwise. Remember Giordano Bruno, who stood for the truth and could not do otherwise.

If circumstances condition human life, and a human being himself changes the circumstances of this life, if a person is the product of social relations, the social relations are themselves a product of the activity of living individuals. Man's free fulfilment of goals which he, as a rational being, sets himself, can be based only on utilisation of the laws of nature and social reality, not on contempt for them.

Consequently, freedom presupposes, above all, a knowledge of laws that are not dependent on human beings, and it is this knowledge that makes people intrinsically free. Thus free will emerges as a concept closely related to the concepts of consciousness and knowledge. Knowledge is not only power, it is also freedom. The only path to freedom is the path to knowledge; ignorance is bondage. The degree of knowledge determines the degree of freedom. One cannot desire what one does not know. The core of freedom is conscious necessity and action, governed by the extent to which we are aware of that necessity, of the possibility of its realisation. Knowledge in itself is not yet freedom, but there can be no freedom without it. Freedom implies not only knowledge of the conditions and laws of development in the present but also preparation of the future results of conscious activity, their prevision. Both personal and social freedom consist not in some imagined independence of objective laws, but in the ability to actively choose and take decisions with a knowledge of the case and, above all, to think and act in conditions that make it possible to realise one's intentions.

The conception of freedom as conscious necessity is an essential, but only the first, step on the road to an understanding of the nature of freedom. It allows us to distinguish freedom from arbitrariness and stresses the priority of objective conditions. Idealism, which maintains the positions of indeterminism, regards the will as an immanent, autonomous, self-contained spiritual force, supposedly generating certain actions from its depths. For example, the existential notion of absolute freedom has no objective

roots. According to Nietzsche, "the will to power" has more need of lucky errors than the truth for which we strive. Why, he asks, is falsehood, the unknown, even ignorance not better than truth? Jaspers's statement that not truth but ignorance is the guarantee of freedom strikes us as a meaningless paradox. According to Jaspers, the freest people of all are the insane, because they have no logic. Existentialism interprets the human being as a force standing in opposition to the world and hostile to it. Its system of philosophy thus transforms will into what is, essentially, mere self-will. This is an apology not for freedom but for arbitrariness. There is a counterblast to this notion in Feuerbach, who believed that freedom was not the right of any man to be a fool in his own way. If we think that freedom is something absolute, independent of all objective necessity, we resemble the imaginary pigeon who believed that it would have flown much faster had it not been for the resistance of the air. It forgot one "little" thing: without air it could not live, let alone fly.

The framework of human freedom, its reality, is objective necessity. Freedom is a river that flows within the banks of the laws of life. The law-governed course of historical events in which people take part is realised not despite but through the human will, through people's conscious actions. A correct understanding of determinacy rules out any one-sided dependence of human actions on external influences. This dependence is mediated both by the nature of the person, his total experience, interests, character, value orientations, and so on. The effect of external influences on a person depends on how that person reacts to these influences, to what extent they affect the vital cords of his being. Depending on his personal beliefs and conscience, a human being is free to desire both good and evil. The content of a person's beliefs manifests itself in decisive actions. This is what makes a person responsible for them. When he chooses one action from a number of possible actions and rules out the others, the chosen action is also determined.

But it was not predetermined before it took place. Until the action is completed, not all the determining factors are present. To assume that it was completely determined before it took place would be to substitute predestination for determinacy and thus exclude freedom altogether. In human actions everything is determined but there is nothing predestined in them. Man is not ruled by the power of fate. What is more, the apparent incompatibility of freedom and necessity, in the sense of determinacy of events, arises because along with acknowledgement of the determinacy of human actions these actions themselves, and also the decisions involved, are thought of as being outside this determinacy. A person defends his freedom not from being determined by everything that exists but from the blind irrational forces, which impose the fetters of taboo and compulsion on his thoughts, his feelings and his will. Consequently the measure of freedom is part of the concept of man.

Man is free not from nature, not from society and their laws, but within the framework provided by the operation of both the laws of nature and society. When they are known, they make a person's will relatively free. But they also determine its limits, the limits to the realisation of goals that man sets himself: free will is not self-will, arbitrariness. Spinoza in his day thought that freedom should be understood as free necessity and not as arbitrariness. The will is the most active part of the human consciousness. It shows itself in the desire to act, in choice of the direction of action, in the decision to act in a certain way and realise a certain goal. A human being is not a piece of driftwood on the waves of cause-effect connections. He is active. Free will manifests itself precisely in purposeful activity.

To sum up, freedom is the ability, based on knowledge of necessity, to choose and to act in accordance with this necessity. It consists not only in knowledge of natural and social laws but also in the practical realisation of this knowledge. Realisation of freedom presupposes the overcoming of certain obstacles, and the more difficult the obstacles, the stronger and more freedom-loving the will must be. "... Freedom is not a reward or a badge of distinction that is celebrated with champagne. It is not some nice present, such as a box of chocolates. Oh, no! Quite the contrary, it is an imposition, a gruelling race that one must run alone. No champagne, no friends to raise a toast and give you their friendly encouraging glances. You are alone in a dim hall, alone in the dock before your judges, and alone you must answer to yourself and to the court of humanity. At the end of every freedom there awaits retribution, and that is why freedom is too hard to bear...."

A human being realises his essence in material and intellectual activity, in its results, which appear as his "objectified" human abilities, skills, ideas, feelings and will. Consequently, the whole history of material and spiritual culture emerges as the external existence of man's inner world.

Free will is. the mode of realisation of one of the possibilities of action, the creative drawing up of an ideal plan of action, the process of goal-setting, which presupposes the choice of only one reference point from a whole hierarchy of possible directions and motives. Every choice means ruling out what is not chosen and emphasises the vital significance of what is. Thus in its very essence action presupposes a relative freedom of will, the possibility of choice. Some people believe that choice is made not so much by the individual as by circumstances, which choose for him. This also happens. But it is not characteristic of strong-willed people. Freedom lies not only in the choice of a

certain aim from a number of possibilities, but also in creativity, in the setting of new goals. Freedom is not only conscious necessity, but also the existence created by human beings themselves, the social relations, the world of material and intellectual culture. Historical necessity arises as the natural outcome of the subjective orientation of human actions and their objective result, which takes shape independently of will and consciousness. In this case dialectics means that the freedom of the individual acting in history becomes through the results of his actions his necessity.

The idea of freedom is wholly human and social. It differs in every concrete historical set of circumstances. In itself freedom is an abstraction. As a reality it is always full of concrete historical meaning. Freedom is a historically developing thing, a process of development that is never fully realised. Nature knows no freedom. "The first men who separated themselves from the animal kingdom were in all essentials as unfree as the animals themselves, but each step forward in the field of culture was a step towards freedom." Because it is social, the idea of freedom is historical and reflects the metamorphoses of the idea of fate and necessity. By no means everything in human life and relations is the result of the realisation of freedom. They also contain much that is irrational and inevitable, they are bound by a framework that sets the limits of the permissible for every historical epoch. The degree to which the individual's personal freedom is curtailed by his duty to the state varies greatly, and is both concrete and historical.

All nations, the best minds of humanity have from time immemorial longed passionately for a just social system, for democracy, for freedom. When voiced by the people, this word makes dictators and tyrants shudder. Under the banner of freedom the rising people

have toppled the thrones of monarchs and the power of capital. The whole history of mankind may be pictured as a stubborn ascent to the cherished peaks of liberty. The call for freedom has always had popular appeal. Despite all contradictions, freedom has blazed a road for itself even in the face of antagonistically contradictory social development.

The feudal lord possessed great freedom and arbitrary power because his subjects were deprived of freedom. In slave society this contradiction was even more striking. Through contradictions, including antagonistic ones, the history of mankind moves along the path of development of freedom for the individual, both in relation to the spontaneous forces of nature and to social conditions. To achieve social freedom one must first "kill the slave in one's own self".

"What kind of freedom?" asks Dostoyevsky. "Equal freedom to do anything one likes within the limits of the law. When can one do that? When one has a million. Does freedom give everyone a million? No. What then is a person without a million? A person without a million is not one who does anything he likes but one who has everything that other people like done to him."

Reflecting on the exploiting society of his day, Schiller wrote:

Into the bosom's holy, silent cells,
Thou needs must fly from life's tumultuous throng!
Freedom but in the realm of vision dwells,
And beauty bears no blossoms but in song.

The true freedom of the working man in an exploiting society shows itself in revolutionary action aimed at realising the objective laws of history. The desire for freedom is an essential feature of the revolutionary character.

The objective conditions for true freedom come about only with the abolition of the society based on relations of domination and obedience, on various forms of oppression. Marx and Engels defined personal freedom as the positive strength to manifest true individuality, they believed that to secure freedom "each man must be given social scope for the vital manifestation of his being". In communist society, Marx observed, beyond the realm of necessity there would begin the development of the human personality as a goal in itself.

Responsibility. Human behaviour is regulated by many factors, including moral standards, the sense of shame, of conscience, of duty, and so on. The basic manifestations of the ethical life are the sense of social and personal responsibility and the awareness of guilt that this implies. Responsibility is not only a moral category, but also a psychological, legal and socio-political one.

Great controversy has raged around this problem for centuries. The idealists believe the sources of responsibility to be in the immanent principles of the human personality, even in the depths of its psychophysiology. For example, according to one conception of psychoanalysis, an individual is essentially helpless in the face of the forces that influence him from within. The responsibility placed upon him by society is merely an illusion. According to this conception, a person has got to realise that he is not the master of his own fate. Officially he is conscious. But although he himself is not aware

of the forces that are at work within him, his choice is determined for him—his conscious will is only an instrument, a slave in the hands of the deep subconscious urge which determines his action.

The existentialists absolutise the individual's responsibility to society, believing that every person is responsible for everything that happens in the world. This thesis is based on the premise that the individual will is independent of the flow of historical events, and that these events are the product of the individual will. Every separate person is responsible for everything because this "everything" is consciously created by him. But this is subjective idealism. It is vividly expressed, for example, in Sartre, who maintains that man, being condemned to freedom, assumes the weight of the whole world on his shoulders; he is responsible for the world and for himself. There is no point in complaining because nothing external has determined what we feel, how we live or what we are. This absolute responsibility, however, is not mere submission. It is simply the logically necessary condition for awareness of our freedom. Such is the position taken by Sartre.

But would it not be more correct to assume that the objective foundation for the individual's responsibility to society and himself is the real relation between society and the individual, which is always contradictory. Responsibility expresses society's specific demand on the individual in the form of duty. There are certain social standards, but there is also freedom of choice, including the possibility of violating these standards. So in all societies a certain responsibility is laid down for such violations. Where there is no choice, there is no responsibility.

It is impossible to discuss morality and law without touching upon the question of free will, of liability, of the relationship between freedom and necessity. The individual becomes aware of his personal responsibility when he knows what other people expect of him. Responsibility may appear in two forms: retrospective and actual, i. e., responsibility for previously performed actions and for actions that are being performed at the given moment.

Responsibility is a state of consciousness, a feeling of duty towards society and oneself, an awareness of the purpose of the actions performed, their consequences for a certain social group, class, party, collective and oneself. Responsibility is society's necessary means of controlling the behaviour of the individual through his consciousness. As an integral attribute of the socially developed personality, responsibility takes the form of the spiritual aspect of all forms of the individual's activity in the moral, political, civic, legal and other spheres. There are no forms of non-responsible activity inasmuch as there is no activity whose consequences do not affect the interests of the individual himself, the social group or society as a whole.

Historically, individual responsibility to society shows a tendency to increase in the wake of social progress. In contemporary society the importance of every individual's civil, political and moral responsibility to society, his responsibility for the fate of nations and of all humanity has sharply increased. The individual is responsible to the extent that he is free in his actions. The individual is generally free only in doing or achieving something that is the realisation of his own intention. It is for this kind of action and achievement that the individual is responsible. He is not responsible and cannot be held responsible for what is done by others against his will. The blame for

such actions cannot be laid at his door. Responsibility and liability have meaning only in so far as they induce positive change in the individual in relation to his future behaviour. Responsibility means much more than accountability. Inward responsibility for one's behaviour and intentions, that is to say, self-control, self-appraisal, and the general regulation of one's life, is also of great importance.

An important form of responsibility is responsibility for the future, both near and distant, which is built on the sense of responsibility for the present and the past.

The character of responsibility and its forms have changed in the course of history. The tribal system knew no personal responsibility. There was responsibility only to the community, which imposed a certain course of action on its members and controlled these actions. The slave society revealed the beginnings of a tendency towards individuality. While the commune fettered the actions of the individual, the slave society allowed him to act at his own risk, with a certain degree of independence. During the slave-owning period the individual was responsible not to the community, nor yet to himself, but to the polity and to the gods. With the rise of the state the concept of individual responsibility to the state, the monarch and to God began to take shape.

As the idea of state developed and with it culture, there arose the idea of personal responsibility, which was to be further developed in feudal society. On the historical philosophical plane the idea of responsibility to oneself begins with Socrates, with his persistent listening to his own inner voice, the voice of conscience. It was Socrates who sought in the individual certain eternal standards that could not be violated.

The Middle Ages saw a deepening of the subjective world and the formation of a complex hierarchy of personalities— the divinity, the tsar or king as god's deputy on earth, the servant of god, the feudal lord, the steward and so on. The whole gigantic pyramid took possession of man's consciousness and dictated certain modes of action.

Under capitalism the degree of individual responsibility to society further increases. The working class, all working people of both hand and brain, led by parties that truly represent their interests, take responsibility for the future of society as the general crisis of capitalism develops.

Individuals in large numbers, the masses strive to judge whether their actions are correct or not. This inner judge is what we call conscience. Historically, the prick of conscience was most vividly expressed in the immortal image of Hamlet, in whom this dawning self-consciousness became tremendously important as a spiritual motivator and controller of all his actions. Evidently it was at that time that the idea of conscience was making its way into social consciousness. Today the role of conscience is greatly enhanced by, among other things, the manufacture of the means of mass extermination.

When atom bombs were dropped on Hiroshima and Nagasaki, causing monstrous destruction and suffering, many scientists, technologists who took part in the making of these deadly weapons, and the men who had used them, experienced agonising pangs of conscience and one of the pilots went mad. The usual argument is that they were only executors of the will of the politicians and the military, who in their turn excuse

themselves on the ground of historical necessity, the interests of the nation, and so on. The argument thus becomes a vicious circle.

How are we to regard the idea of personal and social responsibility, the inner judge of socially significant human actions, the social conscience of the individual? Any scientific solution of this problem rests on the practical solution of the problem of the individual's right to real freedom.

The idea of man's responsibility for his actions has with great difficulty and suffering penetrated the consciousness of society. It has made its way as the individual has won the right to independent decision-making and freedom of personal behaviour. The early capitalist period placed a gigantic responsibility on the individual and helped to develop individuality. Individuals made discoveries and inventions, travelled to new lands, created masterpieces of literature, painting, sculpture, and so on.

To say that a person is responsible is to say that he is capable of correctly answering the question of what is right in the moral, legal, political and other respects. Any responsibility is based on knowledge of what is necessary in the interests of the group and society as a whole. A human being cannot be regarded as a cybernetic machine processing information fed into it. It is responsibility that expresses the individual's appraisal of his ability to be a personality, to control his actions, to combine word and deed, to be able to use his freedom rationally. If we want to decide whether the given individual could or could not have acted differently, our criterion is primarily the objective circumstances and possibilities, while the measure of responsibility is decided by the degree to which the individual made intentional use of the available opportunities.

The main difficulty of the problem of responsibility lies in establishing not so much responsibility as its degree, i.e., the individual's voluntary, conscious participation in determining reprehensible or criminal action. A closer inspection of the motivation of every individual act shows that independently taken decisions and actions are determined to some extent by such factors as the objective coincidence of circumstances, a person's habits and character, weakness or strength of will, and so on. All this and much else influence the direction of his thoughts, his choice of goals, his motivation. Added to which, the sphere of possible choice is sometimes so narrow that the choice itself is merely a formality. So the problem of the compulsory and the voluntary becomes extremely complicated and confusing.

The real measure of responsibility that a person bears for his actions depends on the real conditions that life has granted him for consciously evaluating the consequences of his actions and taking a corresponding personal stand.

Responsibility is the concern not of fists, but of the will. A person may bear responsibility only for intentional activity. Without intention there is no responsibility. When a crime is committed without intent, there is no complete unity between the external and internal aspects of the action. Guilt due to negligence lacks awareness of the possibility of the consequences that actually occurred. Oedipus, who killed his father without knowing it, cannot be held responsible for patricide despite the views held on this point by the ancient world. Depending on the conditions, people have to answer in different ways for their actions and they do answer for them in different ways.

Every human action, when it becomes part of the independent course of events, leads to results that do not coincide with its immediate aim. What is more, the aim that the person sets himself does not always coincide with his motive, i.e., with the goal that he seeks to achieve by his action. The question then arises as to what actually is a person responsible for—only for his aim, his inward intention and motive or for the result of his action?

In life there are cases when an action prompted by good intentions has disastrous or even tragic consequences. And on the other hand, a person may for discreditable reasons perform an action which produces good results. Such cases are used sometimes to contrast subjective intentions and objective results, so that the subjective can be distinguished from the objective on the practical plane. But this purely superficial contrasting cannot be accepted as logic. In fact, every intention of an individual performing some action stems and must inevitably stem from the foreseeable, desirable result of the action. When a person, guided only by good intentions, fails to foresee the results of his actions, this merely means that he has not fully considered certain consequences which do not form a part of his intention.

A person's action, which he willed to become part of external circumstances, develops in various directions according to a chain of cause-effect connections. Any separate action may have a large number of consequences. When they acquire an independent life, these consequences may run very far and lead to effects that were never intended by the person concerned. Thus the question is transferred to the practical plane and may now be reduced to a discussion of precisely what consequences should in fact be taken into account, and to what extent. Obviously all the consequences that could be foreseen must

be considered. Any failure to take into account the consequences of one's action constitutes an irresponsible or not fully responsible attitude to what one is doing. At the same time, when appraising an action, the right approach is to consider not everything that might have followed but only what could have been foreseen out of everything that actually did follow. This is what a person is responsible for and this is where his guilt may lie. In contrast to such conscious responsibility, a group of physically involved people whose individual wills have been suppressed and who have lost conscious control of their actions and their sense of social responsibility, are nothing but a mob.

Freedom manifests itself not only in practical action, but also in thought. Something new can be created only by a person who is thinking freely, who has shaken off the fetters of obsolete orthodox doctrines, as was the case, for example, with the thinkers of the New Age, who broke down the spiritual prison of medieval scholasticism.

Human freedom is manifest not only in the choice of a line of conduct, not only in control over the forces of nature and conscious reform of social relations. It is vividly expressed also in the individual's power over himself, over his instincts, inclinations and feelings. He is responsible both to society and his own conscience, for the forms in which these are expressed. Man becomes more perfect when he learns, under the influence of education, of moral, social and state demands, to consistently restrain impulses that are forbidden by social standards. And conversely we see that the person who has lost the power of self-restraint speaks and acts in a way in which he would not allow himself to do in an ordinary frame of mind and which he bitterly regrets when he returns to normal.

The cosmonaut who ventures into outer space is moved by his sense of duty to his people, and this inhibits the innate defensive biological reaction which generates a sense of fear. Such actions reflect man's long battle with his emotions and biological instincts in the name of rational forms of behaviour. They crown man's centuries of struggle for the right to call himself a personality. Man's development has been not so much a matter of suppressing his various biological instincts as of their noble expression, based on the demands of the social mode of his existence.

Life and the Planets

From: The Future of Man by Pierre Teilhard de Chardin

DURING THE FIVE years that the Earth has trembled beneath our feet, its vast human masses splitting and reforming, we have begun to be conscious of the fact that we are in the grip of forces many millions of times transcending our individual liberties. For even the most positivist and realist among us the evidence is growing that the present crisis far exceeds the economic and political factors which seemed to provoke it, and within the framework of which we may have hoped that it would remain confined. This conflict is no merely localized and temporary affair, a matter of periodical readjustment between nations. The events we are witnessing and undergoing are unquestionably bound up with the general evolution of terrestrial life; they are of planetary dimensions. It is therefore on the planetary scale that they must be assessed, and it is in these terms that I ask you to consider them, so that we may better understand, better endure, and, I will add, better love these things greater than ourselves which are taking place around us and sweeping us along in their course. What does the world-adventure upon which we are embarked look like, when we seek to interpret it both objectively and hopefully in the light of the widest, soundest and most modern concepts of astronomy, geology and biology? That is what I propose to discuss here: not from the viewpoint of Sirius, as the saying is-that is to say, with the lofty detachment of an observer seeing things from so far off that they fail to touch him-but with the anxious intensity of a son of Earth who draws back in order to be able to see more deeply into the matter and spirit of a movement upon which his happiness depends. This lecture is divided into three parts:

One. The place of living planets in the Universe. Smallness and vastness.

Two. The place of Man on the planet Earth-at the head.

Three. The place of our generation-our own place-in the evolution of Mankind.

Assessment. And finally a summing-up: the end of planetary life. Death or escape? Let us begin.

1. LIVING PLANETS IN THE UNIVERSE

1. From the Point of View of the Immense: The Apparent Insignificance of the Earth

FROM WHAT WE now know of astronomy the planets would seem at first sight to be a perfectly insignificant and negligible element in the universe as a whole. How does the sidereal universe look to the eyes of modern science? No doubt you have gazed up at the sky on a fine winter's night and, like innumerable human beings before you, had an impression of a serene and tranquil firmament twinkling with a profusion of small, friendly lights, all apparently at the same distance from yourself but telescopic and spectroscopic observation, and increasingly exact calculations, are transforming this comfortable spectacle into a vision that is very much more unsettling, one which in all probability will profoundly affect our moral outlook and religious beliefs when it has passed from the minds of a few initiates into the mass-consciousness of Mankind as a whole: immensities of distance and size, huge extremes of temperature, torrents of energy. That we may better understand what the earth means, we must try to penetrate, step by step, within this "infinity." First, the stars. The stars constitute the natural sidereal unit. It is toward them therefore, the analysis of their structure and the study of their distribution, that the researches of astrophysics are principally directed. The process of research is one based entirely on the analysis of light, calling for miracles of patience, ability and acumen; but it is astonishingly fruitful, since it enables exact measurements to be made of the mass, energy, diameter, distance and movement of objects vast in themselves but ultramicroscopic to us because of their remoteness. The

first thing to note is that, in certain aspects, the stars seem to vary a great deal among themselves. Certain of them, the "red giants," are of colossal dimensions, their diameter exceeding 450 times that of the Sun (if the Sun were as large as they it would extend beyond Earth, Jupiter and Saturn as far as Uranus!) Others, the "white dwarfs," are smaller than the earth; and still others, the most numerous category, closely resemble the Sun both in their dimensions and their yellow color. We find similar contrasts of brilliance and temperature. One star may be the equivalent of 300,000 suns in luminosity, whereas another may amount to only a fifty-thousandth part of it (as great a difference, the astronomer Sir James Jeans observed, as there is between a lighthouse and a glowworm). These, of course, are extreme cases. In the matter of surface temperature, if the Sun and the majority of stars are round about $6,000^{\circ}$ Centigrade (three times the temperature of an electric arc) there are some of $11,000^{\circ}$ (Sirius) and even of $23,000^{\circ}$; and on the other hand there are some as low as $3,500^{\circ}$ (the red giants). But beneath this great diversity, which is due principally to the varying ages of the stars, there is concealed a sort of deep identity. Whether giants, medium-sized or dwarfs, the stars are curiously similar in mass (from one to ten times the mass of the sun), which proves, incidentally, that they must vary prodigiously in their mean density-1.4 in the case of the Sun, but 50,000 and even 300,000 in the case of the dwarf stars (a fragment the size of a pinch of snuff, brought from one of these to Earth, would weigh a ton!) So we have approximate identity of mass, and therefore calibration. If we now consider the number of the stars ($15,000 \times 10^6$ visible to the optical telescope alone) you will understand how it is possible to say, cosmically speaking, that we are enveloped in a sort of monstrous gas formed of molecules as heavy as the Sun moving at distances from each other so great that they have to be reckoned in light-years (bearing in mind that light travels at a speed of 186,000 miles per second, and that we are only eight light-minutes distant from the Sun)-a gas made of stars! A gas of stars. The very conjunction

of the two words is startling. But the shock is even greater when we learn that these myriads of suns scattered in the void are no more than the grains forming a supergrain of infinitely greater magnitude, and that this in its turn is no more than one unit amid a myriad of similar units! Imagination is confounded... Yet this is what we learn, beyond any possibility of doubt, from the Milky Way and the other galaxies. You will all have gazed in curiosity at the Milky Way, that long whitish ribbon which, extending from east to west over the two hemispheres, girdles our firmament. Astronomers have long felt that this mysterious, luminous train must constitute one of the most important structural features of the Universe. They sought, therefore, to decipher it, and they have succeeded in doing so. This is the conclusion, dumbfounding but certain, at which they have arrived. The Milky Way, they tell us, is not at all, as one might suppose, a sort of cloud of diffused matter drifting like a mist among the stars. Instead, it denotes the boundary, it marks the equatorial contour, of a prodigious lenticular accumulation of cosmic matter nursing, in its spiral arms, the solar system, all our constellations, all our visible stars, and further millions besides (perhaps $100,000 \times 10^6$ altogether); these latter being so remote from us that their total effect is to convey no more than a vague, milky impression to our eyes. It has been possible to calculate the dimensions of this extraordinary celestial formation and the speed with which it rotates upon itself. According to Jeans its diameter is about 200,000 light-years and it takes 3 million years to complete a single revolution, at a peripheral speed of several hundred miles per second. Compared with this stupendous disc, Jeans remarks, the Earth's orbit is no bigger than a pin's head compared with the surface of the American continent. But the Milky Way, our Milky Way, is not the only one of its kind in the Universe. Here and there small milky patches are to be discerned in the sky, which the telescope shows to be spiral clouds containing sparks of brilliance. These, as we now know, are infinitely farther away from us than the stars. They do not belong to our own, immediate world-or,

as one might put it, to the sidereal vessel which bears us. They are other islands, other fragments of the Universe, other Milky Ways sailing in convoy with our own through space (or even diverging from it at fantastic speeds). Several millions of these galaxies have already been counted (each, we must remember, composed of millions upon millions of stars), separated from one another by an average distance of 2 million light-years, and all of approximately the same size! A gas of galaxies on top of a gas of stars This is the truly overwhelming spectacle, far beyond our power to picture it, in which our present vision of the Universe culminates when we look in the direction of the Immense. But must we not assume, following the logic of this principle of recurrence, that even beyond this there are supergalaxies, each formed of a group of spiral nebulae? We cannot be sure, but it seems improbable. The Universe is not composed, as Pascal thought, of pieces enclosed one in another, repeating themselves indefinitely and identically from bottom to top, from the infinitesimal to the immense. At a certain level the cosmic structure stops dead, and we pass on to "something else." Beyond the galaxies there is nothing, according to Einsteinian physics, unless it be the spherical frame of Space-Time within which all things move in a circle, without ever coming to an end or being able to leave it Let us put aside this still unresolved problem of the upper limits of the world, and since we do not yet know what may be beyond or around the galaxies, let us at least consider what unites them-that is to say, try to describe the genesis of their swarm. It is along this path, as you will see, that we shall eventually encounter the planets in search of which we started out. At the very beginning, so the astronomers tell us-that is to say, billions of years ago-there was in place of the present world a diffused atmosphere, billions of times less dense than air, spreading in all directions over billions of miles. This "primordial chaos," as Jeans calls it, must have seemed homogeneous; but inasmuch as it was subject to the force of gravity it was excessively unstable. A slight unevenness of distribution occurring by chance at any

given point (a contingency that was bound to arise) was all that was needed to cause the entire edifice to break up into parts which, sundering themselves from their neighbors, coiled in more and more tightly upon themselves in enormous clots-their vastness, by the law of celestial mechanics, being directly proportionate to the lightness of the matter of which they were originally composed. This was the first stage of the birth of the galaxies. The same disruptive process then operated within the separate galaxies, engendering smaller clots, since cosmic matter had become heavier. Thus the stars appeared. Are we then to suppose that a third stage occurred in which the stars, in their turn, gave birth to planets through the condensation of their substance? This was the famous theory of Laplace; but a more thorough analysis of the problem has shown that it could not have happened in this way. Astronomers are today agreed that the distribution and movement of the heavenly bodies composing the solar system can only be explained by the hypothesis of a purely fortuitous occurrence-for example, the near contact of two stars. This is to say that Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus or little Pluto, the farthest of all, would not exist had not another sun, by an extraordinary chance, passed so near to our sun as almost to touch it (within three diameters!) wresting from it, by force of attraction, a long, cigar-shaped filament which in the course of time broke

up into a string of separate globes. I And this brings us to the heart of the problem we set out to solve, namely: "What is the place, the significance and the importance of our planets in the Universe?" Because of their very small dimensions (even Jupiter is a dwarf I There is a tendency nowadays to abandon "catastrophic" theories in favor of "evolutionary" theories (a return to the Kant-Laplace nebula under a new form, cf. Weizsacher's theory). [Ed.]. compared with the Sun), the extreme weakness of the energy they radiate, and the short time they have been in existence (the galaxies were billions of years old when the solar system was born); even more important, because of

their mode of existence, the planets look not merely like poor relations but like strangers and intruders in the sidereal system. Created by chance, they have no place in the normal and orthodox evolution of astral matter; with the exasperating result that we know nothing for certain about the existence or frequency of occurrence of planets outside the solar system. In Laplace's thesis almost every star should have its girdle of planets. In present-day theory perhaps one star in 100,000 Jeans's estimate: Eddington puts the figure at millions) possesses them. And if to this we add the fact that, in the case of any given planet, it calls for a further extremely rare accident to produce the conditions which would endow it with life, we can see what a fantastically small figure, quantitatively speaking, our Earth cuts in the Universe. I said just now, in seeking to describe the magnitude of the human events which are overtaking us, that they were of "planetary" importance. But is not "planetary" almost synonymous with "infinitesimal"? Let me recall from memory the hard words of Jeans (he wrote more hopeful ones later, you will be relieved to learn): "What does life amount to? We have tumbled, as though through error, into a universe which by all the evidence was not intended for us. We cling to a fragment of a grain of sand until such time as the chill of death shall return us to primal matter. We strut for a tiny moment upon a tiny stage, well knowing that all our aspirations are doomed to ultimate failure and that everything we have achieved will perish with our race, leaving the Universe as though we had never existed.... The Universe is indifferent and even hostile to every kind of life." But let us boldly state it: this bleak vista is not only so discouraging as to make action impossible; it is so much at variance, physically, with the existence and exercise of our intelligence (which, after all, is the one force in the world capable of dominating the world) that it cannot be the last word of Science. Following the physicists and astronomers we have thus far been contemplating the Universe in terms of the Immense-immensity of space, time, energy and number. But is it not possible that we have been looking through the wrong end of

the telescope, or seeing things in the wrong light? Suppose, instead, we survey the same landscape without, of course, attempting in any way to alter its arrangement—in its biochemical aspect, that of Complexity.

2. In Terms of Complexity; or the Planets as Vital Centers of the Universe

WE WILL DEFINE the "complexity" of a thing, if you allow, as the quality the thing possesses of being composed of

- a. a larger number of elements, which are
- b. more tightly organized among themselves.

In this sense an atom is more complex than an electron, a molecule more complex than an atom, and a living cell more complex than the highest chemical nuclei of which it is composed, the difference depending (on this I insist) not only on the number and diversity of the elements included in each case, but at least as much on the number and correlative variety of the links formed between these elements. It is not, therefore, a matter of simple multiplicity but of organized multiplicity; not simple complication but centered complication. This idea of complexity (more exactly, centrocomplexity) is easily grasped. In a universe where science ends by analyzing everything and taking everything apart, it simply expresses a particular characteristic applicable to every kind of body, like its mass, volume or any other dimension. But what do we gain by using this characteristic, rather than another, for the purpose of classifying the objects around us? I will cite two advantages, although it means somewhat anticipating the latter parts of this lecture. First, in the multitude of things comprising the world, an examination of their

degree of complexity enables us to distinguish and separate those which may be called "true natural units," the ones that really matter, from the accidental pseudo-units, which are unimportant. The atom, the molecule, the cell and the living being are true units because they are both formed and centered, whereas a drop of water, a heap of sand, the Earth, the Sun, the stars in general, whatever the multiplicity or elaborateness of their structure, seem to possess no organization, no "centricity." However imposing their extent they are false units, aggregates arranged more or less in order of density.

Secondly, the coefficient of complexity further enables us to establish, among the natural units which it has helped us to "identify" and isolate, a system of classification that is no less natural and universal. Let us try to depict this classification in schematic form, as it might be drawn on a blackboard. At the very bottom of the board we have the ninety-two simple chemical elements (from hydrogen to uranium) formed by groups of atomic nuclei together with their electrons. Above these come the molecules composed of groups of atoms. These molecules, in the case of the carbon compounds, may become enormous. In the albuminoids (or proteins) there may be thousands of associated atoms: the molecular weight of hemoglobin is 68,000. Above these again come the mysterious viruses, strange bodies producing a variety of maladies in animals and plants, concerning which we do not yet know if they are monstrous chemical molecules or living infrabacteria. Their molecular weight runs into millions. Higher still we come to the lowest cells. I do not know if any attempt has yet been made to ascertain the atomic content of these (it must amount to billions) but they are undoubtedly groups of proteins. And finally we reach the world of higher living forms, each composed of groups of cells. To take a very simple instance, that of the plant duckweed; its content is estimated to be 4×10^{20} atoms. For the present we will disregard an even higher category which may conceivably have its place at the head of the list—that formed by the grouping, not merely of cells, but of metazoa synthetically associated in such a manner as to comprise,

when taken together, a single, living superorganism. We shall come back to this. This scheme of classification, based essentially on the intimate structure of beings, is undeniably natural in principle. But it can also be seen to possess a double and extreme significance. It is significant, in the first place, because for the scientist it bridges the long-standing, troublesome and seemingly irreducible gap between biology and physics. The wide distinction, which for philosophical reasons it has been thought necessary to draw between life and matter, ceases to be valid as a law of recurrence comes to light, in the phenomenal field, experientially linking these two orders of phenomena. Beyond the millionth atom everything happens as though the material particles quickened and were vitalized; the Universe organizes itself in a single, grand progression, somewhat untidy no doubt, but on the whole clear in its orientation, ascending from the most rudimentary atom to the highest form of living things. Secondly it is significant because, arranged according to our scale of complexity, the elements succeed one another in the historical order of their birth. The place in the scale occupied by each particle situates the element chronologically in the genesis of the Universe, that is to say, in Time. It dates it. Thus the rising scale conforms both to the ascending movement toward higher consciousness and to the unfolding of evolutionary time. Does not this suggest that, by using the degree of complexity as a guide, we may advance very much more surely than by following any other lead as we seek to penetrate to the truth of the world and to assess, in terms of absolute values, the relative importance, the place, of all things? With this in mind let us look again at the vast sidereal units (galaxies and suns) and this time try to assess their importance not in terms of their immensity or even complexity (since, as I have said, nebulae and stars are no more than aggregates) but in terms of the complexity of the elements which compose them. We now see a very different picture; a complete reversal of values and perspective. Let us look first at what is largest, the galaxies. In their least condensed parts (that is to say, in what they still contain of the vestiges of primordial

chaos), the matter composing them is extremely tenuous; probably hydrogen, the most primitive substance known to us in the field of distinguishable matter. One nucleus and one electron: the simplest combination imaginable. Now come down a stage in the scale of the immensities and look at the stars. Here the chemism is more elaborate. Whether in the red giants, the medium yellows or the white dwarfs, we may surmise the presence in the center of heavy and extremely unstable elements possessing a greater atomic weight than uranium (unless these are simply "ordinary matter" reduced to a physical state of extraordinary compression). At the same time, in the lighter surface-zone enveloping these depths the spectroscope can discern the entire range of our simple elements. In the stars, therefore, if we compare them with the original galaxies, the degree of complexity rises rapidly; but, and this is of major importance, it cannot go beyond a certain stage; that is to say (if we except a number of simple groups perceptible in the incandescent atmosphere of certain stars) it cannot reach the level of the composite bodies, i.e., the large molecules. The fact is that even on the periphery of these prodigious centers of energy the temperature is far too great for any higher combination to possess stability. The stars are essentially laboratories in which Nature, starting with primordial hydrogen, manufactures atoms. For the operation to go beyond this point we have to imagine two astonishing things: First, that by a sort of "skimming" process a portion of the stellar substance separates from the rest, deriving entirely from the surface-zone of lighter atoms which are not constantly threatened with radioactive disintegration. The larger molecules can only be constructed of elements possessing almost unlimited stability. Secondly, that this light and stable "cream" of any given star, having escaped beyond the reach of the tempest of energy blazing at the heart of the parent-body, may yet remain sufficiently close to it to derive a moderate benefit from its radiations: for the large molecules need energy for their synthesis. But are not these two providential occurrences (the selection of a suitable "dough" and its treatment in a suitable "oven")

precisely what that mysterious body, our father-star, effected in a single operation when, passing close to our Sun, it detached from its surface and scattered over a wide distance the ribbon of matter that became the planets? You will now see where my argument is tending, or more exactly, where the guide which we have elected to follow, the scale of complexity, is irresistibly leading us. Despite their vastness and splendor the stars cannot carry the evolution of matter much beyond the atomic series: it is only on the very humble planets, on them alone, that the mysterious ascent of the world into the sphere of high complexity has a chance to take place. However inconsiderable they may be in the history of sidereal bodies, however accidental their coming into existence, the planets are finally nothing less than the key-points of the Universe. It is through them that the axis of Life now passes; it is upon them that the energies of an Evolution principally concerned with the building of large molecules is now concentrated. We may well be dismayed by the rarity and improbability of heavenly bodies such as our own. But does not everyday experience teach us that in every order of Nature, and at every level, nothing succeeds except at the cost of prodigious waste and fantastic hazards? A monstrously fragile conjunction of chances normally dictates the birth of the most precious and essential beings. We can only bow before this universal law whereby, so strangely to our minds, the play of large numbers is mingled and confounded with a final purpose. Without being overawed by the Improbable, let us now concentrate our attention on the planet we call Earth. Enveloped in the blue mist of oxygen which its life breathes, it floats at exactly the right distance from the sun to enable the higher chemisms to take place on its surface. We do well to look at it with emotion. Tiny and isolated though it is, it bears clinging to its flanks the destiny and future of the Universe.

II. MAN ON THE PLANET EARTH: THE MOST COMPLEX OF MOLECULES

HAVING ESTABLISHED, ON the basis of complexity, the astral preeminence of the planets in the sidereal system, and particularly that of the Earth, our obvious next step is to seek to determine, in cosmic terms, the significance and value on Earth of what we very improperly call "the human species." If the essential function and dignity of the Earth consist in its being one of the rare laboratories where, in time and space, the synthesis of ever larger molecules is proceeding; and if, as our table of complexity shows, living organisms, far from originating in germs fallen upon Earth from the celestial spaces, are simply the highest composites to spring from planetary geochemism, then the discovery of Man's absolute place in the Universe becomes simply a matter of deciding what position we who constitute Mankind occupy in the evolving range of super molecules. Here, however, a difficulty arises. Where relatively simple molecular units are concerned their order of complexity may be roughly expressed by the number of atoms they contain, their "corpuscular number" as one might call it. But when this corpuscular number exceeds a million (from the virus on) and still more when we come to the higher forms of life (there are something like a hundred billion cells in an average mammal, and hundreds of millions of atoms to each cell!) it becomes impossible to estimate the number of atoms, which would be so vast as to be almost meaningless even if it could be calculated. At this level of organization, in fact, the actual number of atoms contained in complex units is of minor importance compared with the number and quality of the links established between the atoms.

HOW THEN ARE we to go about classifying the higher living units so that the position of Man in terms of complexity may be determined? What method shall we adopt? We can do it very simply by introducing what is called a change of variable. The more complex a being is, so our Scale of Complexity tells us, the more is it centered upon itself and therefore the more conscious does it become. In other words, the higher the

degree of complexity in a living creature, the higher its consciousness; and vice versa. The two properties vary in parallel and simultaneously. If we depict them in diagrammatic form, they are equivalent and interchangeable. So it comes to this, that when we have reached the point where complexity can no longer be reckoned in number of atoms we can nevertheless continue to measure it (and accurately) by noting the increase of consciousness in the living creature-in practical terms, the development of its nervous system. This is the solution of our problem. Accordingly, if we use the factor of psychic growth (or, which comes to the same thing, progress of cerebralization) as a scale whereby we may measure the growth of complexity through the maze of invertebrates, arthropods and vertebrates, the position and significance of the human type in nature at once becomes apparent. For of all the numberless types of living units that have appeared in the course of the last 300 million years, Man, judged by his power of reflection (itself bound up with the ultracomplexity of a brain composed of many millions of cells) not only comes indisputably first, but occupies a place of his own at the head of all the other "very great complexes" evolved on Earth. And this incidentally explains why he tends increasingly to break away from the rest of terrestrial life, to detach himself in such a manner as to form (we shall return to this) a separate planetary envelope. What does this mean except that, having been led by the idea of complexity to consider the Earth one of the vital points of the Universe, we find ourselves compelled, following the same principle, to recognize in Man the most advanced, and therefore the most valuable, of all the planetary elements? If it is the Earth which bears the fortunes of the world, then it is Man, in his extreme centro-complexity, who bears the fortunes of the Earth. But if that is our situation, what is our destiny?

III. THE PRESENT STATE OF MANKIND: THE PHASE OF PLANETIZATION

TO OPEN ANY book treating scientifically, philosophically or sociologically of the future of the Earth (whether by a Bergson or a Jeans) is to be struck at once by a presupposition common to most of their authors, certain biologists excepted. Explicitly or by inference they talk as though Man today had reached a final and supreme state of humanity beyond which he cannot advance; or, in the language of this lecture, that, Matter having attained in Homo sapiens its maximum of centro-complexity on Earth, the process of supermoleculization on the planet has for good and all come to a stop. Nothing could be more depressing, but also, fortunately, more arbitrary and even scientifically false, than this doctrine of immobility. No proof exists that Man has come to the end of his potentialities, that he has reached his highest point. On the contrary, everything suggests that at the present time we are entering a peculiarly critical phase of superhumanization. This is what I hope to persuade you of by drawing your attention to an altogether extraordinary and highly suggestive condition of the world around us, one which we all see and are subject to, but without paying any attention to it, or at least without understanding it: I mean the increasingly rapid growth in the human world of the forces of collectivization. The phenomenon calls for no detailed description. It takes the form of the all-encompassing ascent of the masses; the constant tightening of economic bonds; the spread of financial and intellectual associations; the totalization of political regimes; the closer physical contact of individuals as well as of nations; the increasing impossibility of being or acting or thinking alone—in short, the rise, in every form, of the Other around us. We are all constantly aware of these tentacles of a social condition that is rapidly evolving to the point of becoming monstrous. You feel them as I do, and probably you also resent them. If I were to ask your views you would doubtless reply that, menaced by this unleashing of blind forces, there is nothing we can do but evade them to the best of our ability, or else submit, since we are the victims of a sort of natural catastrophe against which we are powerless and in which there is no meaning to

be discerned. But is it true that there is nothing to understand? Let us look more closely, once again by the light of our principle of complexity. The first thing to give us pause, as we survey the progress of human collectivization, is what I would call the inexorable nature of a phenomenon which arises directly and automatically out of the conjunction of two factors, both of a structural kind: first, the confined surface of the globe, and secondly, the incessant multiplication, within this restricted space, of human units endowed by ever-improving means of communication with a rapidly increasing scope for action; to which may be added the fact that their advanced psychic development makes them preeminently capable of influencing and interpenetrating one another. Under the combined effect of these two natural pressures a sort of massconcretion of Mankind upon itself comes of necessity into operation. But, the second noteworthy point, the phenomenon of concretion, or cementing, turns out to be no sudden or unpredictable event. Looking at the picture as a whole we see that Life, from its lowest level, has never been able to effect its syntheses except through the progressively closer association of its elements, whether in the oceans or on land. Upon an imaginary earth of constancy increasing extent, living organisms, being only loosely associated, might well remain at the monocellular stage (if indeed they got so far); and certainly Man, if free to live in a scattered state, would never have reached even the neolithic stage and social development. The totalization in progress in the modern world is in fact nothing but the natural climax and paroxysm of a process of grouping which is fundamental to the elaboration of organized matter. Matter does not vitalize or supervitalize itself except by compression. I do not think it is possible to reflect upon this twofold inrooting, both structural and evolutionary, which characterizes the social events affecting us, without being at first led to the surmise, and finally overwhelmed by the evidence, that the collectivization of the human race, at present accelerated, is nothing other than a higher form adopted by the process of moleculization on the surface of our planet. The first

phase was the formation of proteins up to the stage of the cell. In the second phase individual cellular complexes were formed, up to and including Man. We are now at the beginning of a third phase, the formation of an organicosocial supercomplex, which, as may easily be demonstrated, can only occur in the case of reflective, personalized elements. First the vitalization of matter, associated with the grouping of molecules; then the hominization of Life, associated with a supergrouping of cells; and finally the planetization of Mankind, associated with a closed grouping of people: Mankind, born on this planet and spread over its entire surface, coming gradually to form around its earthly matrix a single, major organic unity, enclosed upon itself; a single, hypercomplex, hypercentered, hyperconscious arch-molecule, coextensive with the heavenly body on which it was born. Is not this what is happening at the present time—the closing of this spherical, thinking circuit? This idea of the planetary totalization of human consciousness (with its unavoidable corollary, that wherever there are life-bearing planets in the Universe, they too will become encompassed, like the Earth, with some form of planetized spirit) may at first sight seem fantastic: but does it not exactly correspond to the facts, and does it not logically extend the cosmic curve of moleculization? It may seem absurd, but in its very fantasy does it not heighten our vision of Life to the level of other and universally accepted fantasies, those of atomic physics and astronomy? However mad it may seem, the fact remains that great modern biologists, such as Julian Huxley and J. B. S. Haldane, are beginning to talk of Mankind, and to predict its future, as though they were dealing (all things being equal) with a brain of brains. So why not? Clearly this is a matter in which I cannot compel your assent. But I can assure you, of my own experience, that the acceptance of this organic and realistic view of the social phenomenon is both eminently satisfying to our reason and fortifying to our will. Satisfying to the intelligence above all. For if it be true that at this moment Mankind is embarking upon what I have called its "phase of planetization," then

everything is clarified, everything in our field of vision acquires a new sharpness of outline. The tightening network of economic and psychic bonds in which we live and from which we suffer, the growing compulsion to act, to produce, to think collectively which so disquiets us-what do they become, seen in this way, except the first portents of the superorganism which, woven of the threads of individual men, is preparing (theory and fact are at one on this point) not to mechanize and submerge us, but to raise us, by way of increasing complexity, to a higher awareness of our own personality? The increasing degree, intangible, and too little noted, in which present-day thought and activity are influenced by the passion for discovery; the progressive replacement of the workshop by the laboratory, of production by research, of the desire for well-being by the desire for more-being-what do these things betoken if not the growth in our souls of a great impulse toward superevolution? The profound cleavage in every kind of social group (families, countries, professions, creeds) which during the past century has become manifest in the form of two increasingly distinct and irreconcilable human types, those who believe in progress and those who do not-what does this portend except the separation and birth of a new stratum in the biosphere? Finally, the present war; a war which for the first time in history is as widespread as the earth itself; a conflict in which human masses as great as continents clash together; a catastrophe in which we seem to be swept off our feet as individuals-what aspect can it wear to our awakened eyes except that of a crisis of birth, almost disproportionately small in relation to the vastness of what it is destined to bring forth? Enlightenment, therefore, for our intelligence. And, let it be added, sustenance and necessary reassurance for our power of will. Through the centuries life has become an increasingly heavy burden for Man the Species, just as it does for Man the Individual as the years pass. The modern world, with its prodigious growth of complexity, weighs incomparably more heavily upon the shoulders of our generation than did the ancient world upon the shoulders of our

forebears. Have you never felt that this added load needs to be compensated for by an added passion, a new sense of purpose? To my mind, this is what is "providentially" arising to sustain our courage-the hope, the belief that some immense fulfillment lies ahead of us. If Mankind were destined to achieve its apotheosis, if Evolution were to reach its highest point, in our small, separate lives, then indeed the enormous travail of terrestrial organization into which we are born would be no more than a tragic irrelevance. We should all be dupes. We should do better in that case to stop, or at least to call a halt, destroy the machines, close the laboratories, and seek whatever way of escape we can find in pure pleasure or pure nirvana. But if on the contrary Man sees a new door opening above him, a new stage for his development; if each of us can believe that he is working so that the Universe may be raised, in him and through him, to a higher level-then a new spring of energy will well forth in the heart of Earth's workers. The whole great human organism, overcoming a momentary hesitation, will draw its breath and press on with strength renewed. Indeed, the idea, the hope of the planetization of life is very much more than a mere matter of biological speculation. It is more of a necessity for our age than the discovery, which we so ardently pursue, of new sources of energy. It is this idea which can and must bring us the spiritual fire without which all material fires, so laboriously lighted, will presently die down on the surface of the thinking earth: the fire inspiring us with the joy of action and the love of life. All this, you may say to me, sounds splendid: but is there not another side to the picture? You tell us that this new phase of human evolution will bring about an extension and deepening of terrestrial consciousness. But do not the facts contradict your argument? What is actually happening in the world today? Can we really detect any heightening of human consciousness even in the most highly collectivized nations? Does it not appear, on the contrary, that social totalization leads directly to spiritual retrogression and greater materialism? My answer is that I do not think we are yet in a position to judge

recent totalitarian experiments fairly: that is to say, to decide whether, all things considered, they have produced a greater degree of enslavement or a higher level of spiritual energy. It is too early to say. But I believe this can be said, that in so far as these first attempts may seem to be tending dangerously toward the subhuman state of the ant hill or the termitary, it is not the principle of totalization that is at fault but the clumsy and incomplete way in which it has been applied. We have to take into account what is required by the law of complexity if Mankind is to achieve spiritual growth through collectivization. The first essential is that the human units involved in the process shall draw closer together, not merely under the pressure of external forces, or solely by the performance of material acts, but directly, center to center, through internal attraction. Not through coercion, or enslavement to a common task, but through unanimity in a common spirit. The construction of molecules ensues through atomic affinity. Similarly, on a higher level, it is through sympathy, and this alone, that the human elements in a personalized universe may hope to rise to the level of a higher synthesis. It is a matter of common experience that within restricted groups (the pair, the team) unity, far from diminishing the individual, enhances, enriches and liberates him in terms of himself True union, the union of heart and spirit, does not enslave, nor does it neutralize the individuals which it brings together. It super personalizes them. Let us try to picture the phenomenon on a terrestrial scale. Imagine men awakening at last, under the influence of the ever-tightening planetary embrace, to a sense of universal solidarity based on their profound community, evolutionary in its nature and purpose. The nightmares of brutalization and mechanization which are conjured up to terrify us and prevent our advance are at once dispelled. It is not harshness or hatred but a new kind of love, not yet experienced by man, which we must learn to look for as it is borne to us on the rising tide of planetization. Reflecting, even briefly, on the state of affairs which might evoke this universal love in the human heart, a love so often vainly dreamed of, but which now

leaves the fields of Utopia to reveal itself as both possible and necessary, we are brought to the following conclusion: that for men upon earth, all the earth, to learn to love one another, it is not enough that they should know themselves to be members of one and the same thing; in "planetizing" themselves they must acquire the consciousness, without losing themselves, of becoming one and the same person. For (and this is writ large in the Gospel) there is no total love that does not proceed from, and exist within, that which is personal. And what does this mean except, finally, that the planetization of Mankind, if it is to come properly into effect, presupposes, in addition to the enclosing Earth, and to the organization and condensation of human thought, yet another factor? I mean the rise on our inward horizon of a cosmic spiritual center, a supreme pole of consciousness, upon which all the separate consciousnesses of the world may converge and within which they may love one another: the rise of a God. It is here that reason may discern, conforming to and in harmony with the law of complexity, an acceptable way of envisaging "the end of the world."

IV. THE END OF PLANETARY LIFE: MATURITY AND WITHDRAWAL

THE END OF the world-for us, that is to say, the end of Earth.... Have you ever thought seriously, in human terms, about that somber and certain eventuality? Which here culminates, we may note, in a sort of proof of the existence of God: "proof by complexity." Life at the beginning seemed modest in its requirements. A few hours in the sun were all it seemed to ask and all it needed to justify itself in its own eyes. But this was only a semblance, belied at the earliest stages of vitalization by the tenacity with which the most humble cells reproduce themselves and multiply. This tenacity continues through all the enormous effusion of the animal kingdom, and bursts into the light of day with the appearance, in thinking Man, of the formidable power of prevision. It cannot but grow still more imperious with every forward stride of human

consciousness. I have spoken of the impulse to act, without which there can be no action. But in practice it is not enough, if the impulse is to be sustained in face of the ever-growing onslaughts of the *taedium vitae*, for it to be offered nothing more than an immediate objective, even though this be as great as the planetization of Mankind. We must strive for ever more greatness; but we cannot do so if we are faced by the prospect of an eventual decline, a disaster at the end. With the germ of consciousness hatched upon its surface, the Earth, our perishable earth threatened by the final, absolute zero, has brought into the Universe a demand, henceforth irrepressible, not only that all things shall not die, but that what is best in the world, that which has become most complex, most highly centered, shall be saved. It is through human consciousness, genetically linked to a heavenly body whose days are ultimately numbered, that Evolution proclaims its challenge: either it must be irreversible, or it need not go on at all! Man the individual consoles himself for his passing with the thought of the offspring or the works which he leaves behind. But what will presently be left of Mankind? Thus every attempt to situate Man and the Earth in the framework of the Universe comes inevitably upon the heavy problem of death, not of the individual but on the planetary scale—a death which, if we seriously contemplate it, must instantly paralyze all the vital forces of the Earth. In an attempt to dispel this shadow Jeans calculated that the Earth has many millions of years of habitability ahead of it, so that Man is still only on the threshold of his existence. He bade us warm our hearts, in this fresh dawn, with the almost limitless prospects of the glorious day that is only beginning. But a few pages previously he had talked of Mankind sadly growing old and disillusioned on a chilling globe, faced by inevitable extinction. Does not that first thought destroy the second? Others seek to reassure us with the notion of an escape through space. We may perhaps move to Venus—perhaps even further afield. But apart from the fact that Venus is probably not habitable (is there water?) and that, if journeying between celestial bodies were practicable, it is

hard to see why we ourselves have not already been invaded, this does no more than postpone the end. We cannot resolve this contradiction, between the congenital mortality of the planets and the demand for irreversibly developed by planetized life on their surface, by covering it up or deferring it: we have formally to banish the specter of Death from our horizon. And this we are enabled to do by the idea (a corollary, as we have seen, of the mechanism of planetization) that ahead of, or rather in the heart of, a universe prolonged along its axis of complexity, there exists a divine center of convergence. That nothing may be prejudged, and in order to stress its synthesizing and personalizing function, let us call it the point Omega. Let us suppose that from this universal center, this Omega point, there constantly emanate radiations hitherto only perceptible to those persons whom we call "mystics." Let us further imagine that, as the sensibility or response to mysticism of the human race increases with planetization, the awareness of Omega becomes so widespread as to warm the earth psychically while physically it is growing cold. Is it not conceivable that Mankind, at the end of its totalization, its folding in upon itself, may reach a critical level of maturity where, leaving Earth and stars to lapse slowly back into the dwindling mass of primordial energy, it will detach itself from this planet and join the one true, irreversible essence of things, the Omega point? A phenomenon perhaps outwardly akin to death: but in reality a simple metamorphosis and arrival at the supreme synthesis. An escape from the planet, not in space or outwardly, but spiritually and inwardly, such as the hypercentration of cosmic matter upon itself allows. This hypothesis of a final maturing and ecstasy of Mankind, the logical conclusion of the theory of complexity, may seem even more farfetched than the idea (of which it is the extension) of the planetization of Life. Yet it holds its ground and grows stronger upon reflection. It is in harmony with the growing importance which leading thinkers of all denominations are beginning to attach to the phenomenon of mysticism. In any event, of all the theories which we may evolve

concerning the end of the Earth, it is the only one which affords a coherent prospect wherein, in the remote future, the deepest and most powerful currents of human consciousness may converge and culminate: intelligence and action, learning and religion.

Xenofeminism: a Politics for Alienation by Laboria Cuboniks

ZERO

0x00 Ours is a world in vertigo. It is a world that swarms with technological mediation, interlacing our daily lives with abstraction, virtuality, and complexity. XF constructs a feminism adapted to these realities: a feminism of unprecedented cunning, scale, and vision; a future in which the realization of gender justice and feminist emancipation contribute to a universalist politics assembled from the needs of every human, cutting across race, ability, economic standing, and geographical position. No more futureless repetition on the treadmill of capital, no more submission to the drudgery of labour, productive and reproductive alike, no more reification of the given masked as critique. Our future requires depetrification. XF is not a bid for revolution, but a wager on the long game of history, demanding imagination, dexterity and persistence.

0x01 XF seizes alienation as an impetus to generate new worlds. We are all alienated -- but have we ever been otherwise? It is through, and not despite, our alienated condition that we can free ourselves from the muck of immediacy. Freedom is not a given -- and it's certainly not given by anything

'natural'. The construction of freedom involves not less but more alienation; alienation is the labour of freedom's construction. Nothing should be accepted as fixed, permanent, or 'given' -- neither material conditions nor social forms. XF mutates, navigates and probes every horizon. Anyone who's been deemed 'unnatural' in the face of reigning biological norms, anyone who's experienced injustices wrought in the name of natural order, will realize that the glorification of 'nature' has nothing to offer us -- the queer and trans among us, the differently-abled, as well as those who have suffered discrimination due to pregnancy or duties connected to child-rearing. XF is vehemently anti-naturalist. Essentialist naturalism reeks of theology -- the sooner it is exorcised, the better.

0x02 Why is there so little explicit, organized effort to repurpose technologies for progressive gender political ends? XF seeks to strategically deploy existing technologies to re-engineer the world. Serious risks are built into these tools; they are prone to imbalance, abuse, and exploitation of the weak. Rather than pretending to risk nothing, XF advocates the necessary assembly of techno-political interfaces responsive to these risks. Technology isn't inherently progressive. Its uses are fused with culture in a positive feedback loop that makes linear sequencing, prediction, and absolute caution impossible. Technoscientific innovation must be linked to a collective theoretical and political thinking in which

women, queers, and the gender non-conforming play an unparalleled role.

0x03 The real emancipatory potential of technology remains unrealized. Fed by the market, its rapid growth is offset by bloat, and elegant innovation is surrendered to the buyer, whose stagnant world it decorates. Beyond the noisy clutter of commodified craft, the ultimate task lies in engineering technologies to combat unequal access to reproductive and pharmacological tools, environmental cataclysm, economic instability, as well as dangerous forms of unpaid/underpaid labour. Gender inequality still characterizes the fields in which our technologies are conceived, built, and legislated for, while female workers in electronics (to name just one industry) perform some of the worst paid, monotonous and debilitating labour. Such injustice demands structural, machinic and ideological correction.

0x04 Xenofeminism is a rationalism. To claim that reason or rationality is 'by nature' a patriarchal enterprise is to concede defeat. It is true that the canonical 'history of thought' is dominated by men, and it is male hands we see throttling existing institutions of science and technology. But this is precisely why feminism must be a rationalism -- because of this miserable imbalance, and not despite it. There is no 'feminine' rationality, nor is there a 'masculine' one. Science is not an expression but a suspension of

gender. If today it is dominated by masculine egos, then it is at odds with itself -- and this contradiction can be leveraged. Reason, like information, wants to be free, and patriarchy cannot give it freedom. Rationalism must itself be a feminism. XF marks the point where these claims intersect in a two-way dependency. It names reason as an engine of feminist emancipation, and declares the right of everyone to speak as no one in particular.

INTERRUPT

0x05 The excess of modesty in feminist agendas of recent decades is not proportionate to the monstrous complexity of our reality, a reality crosshatched with fibre-optic cables, radio and microwaves, oil and gas pipelines, aerial and shipping routes, and the unrelenting, simultaneous execution of millions of communication protocols with every passing millisecond. Systematic thinking and structural analysis have largely fallen by the wayside in favour of admirable, but insufficient struggles, bound to fixed localities and fragmented insurrections. Whilst capitalism is understood as a complex and ever-expanding totality, many would-be emancipatory anti-capitalist projects remain profoundly fearful of transitioning to the universal, resisting big-picture speculative politics by condemning them as necessarily oppressive vectors. Such a false guarantee treats universals as absolute, generating a debilitating

disjuncture between the thing we seek to depose and the strategies we advance to depose it.

0x06 Global complexity opens us to urgent cognitive and ethical demands.

These are Promethean responsibilities that cannot pass unaddressed. Much of twenty-first century feminism -- from the remnants of postmodern identity politics to large swathes of contemporary ecofeminism -- struggles to adequately address these challenges in a manner capable of producing substantial and enduring change.

Xenofeminism endeavours to face up to these obligations as collective agents capable of transitioning between multiple levels of political, material and conceptual organization.

0x07 We are adamantly synthetic, unsatisfied by analysis alone. XF urges constructive oscillation between description and prescription to mobilize the recursive potential of contemporary technologies upon gender, sexuality and disparities of power. Given that there are a range of gendered challenges specifically relating to life in a digital age -- from sexual harassment via social media, to doxxing, privacy, and the protection of online images -- the situation requires a feminism at ease with computation.

Today, it is imperative that we develop an ideological infrastructure that both supports and facilitates feminist interventions within connective, networked elements of the contemporary world. Xenofeminism is about more than digital self-defence and freedom from patriarchal networks. We want to cultivate the

exercise of positive freedom -- freedom-to rather than simply freedom-from -- and urge feminists to equip themselves with the skills to redeploy existing technologies and invent novel cognitive and material tools in the service of common ends.

0x08 The radical opportunities afforded by developing (and alienating) forms of technological mediation should no longer be put to use in the exclusive interests of capital, which, by design, only benefits the few. There are incessantly proliferating tools to be annexed, and although no one can claim their comprehensive accessibility, digital tools have never been more widely available or more sensitive to appropriation than they are today. This is not an elision of the fact that a large amount of the world's poor is adversely affected by the expanding technological industry (from factory workers labouring under abominable conditions to the Ghanaian villages that have become a repository for the e-waste of the global powers) but an explicit acknowledgement of these conditions as a target for elimination. Just as the invention of the stock market was also the invention of the crash, Xenofeminism knows that technological innovation must equally anticipate its systemic condition responsively.

TRAP

0x09 XF rejects illusion and melancholy as political inhibitors. Illusion, as the blind presumption that the weak can prevail over the strong with no strategic coordination, leads to unfulfilled promises and unmarshalled drives. This is a politics that, in wanting so much, ends up building so little. Without the labour of large-scale, collective social organisation, declaring one's desire for global change is nothing more than wishful thinking. On the other hand, melancholy -- so endemic to the left -- teaches us that emancipation is an extinct species to be wept over and that blips of negation are the best we can hope for. At its worst, such an attitude generates nothing but political lassitude, and at its best, installs an atmosphere of pervasive despair which too often degenerates into factionalism and petty moralizing. The malady of melancholia only compounds political inertia, and -- under the guise of being realistic -- relinquishes all hope of calibrating the world otherwise. It is against such maladies that XF inoculates.

0x0A We take politics that exclusively valorize the local in the guise of subverting currents of global abstraction, to be insufficient. To secede from or disavow capitalist machinery will not make it disappear. Likewise, suggestions to pull the lever on the emergency brake of embedded velocities, the call to slow down and scale back, is a possibility available only to the few -- a violent particularity of exclusivity -- ultimately entailing catas-

trophe for the many. Refusing to think beyond the microcommunity, to foster connections between fractured insurgencies, to consider how emancipatory tactics can be scaled up for universal implementation, is to remain satisfied with temporary and defensive gestures. XF is an affirmative creature on the offensive, fiercely insisting on the possibility of large-scale social change for all of our alien kin.

A sense of the world's volatility and artificiality seems to have faded from contemporary queer and feminist politics, in favour of a plural but static constellation of gender identities, in whose bleak light equations of the good and the natural are stubbornly restored. While having (perhaps) admirably expanded thresholds of 'tolerance', too often we are told to seek solace in unfreedom, staking claims on being 'born' this way, as if offering an excuse with nature's blessing. All the while, the heteronormative centre chugs on. XF challenges this centrifugal referent, knowing full well that sex and gender are exemplary of the fulcrum between norm and fact, between freedom and compulsion. To tilt the fulcrum in the direction of nature is a defensive concession at best, and a retreat from what makes trans and queer politics more than just a lobby: that it is an arduous assertion of freedom against an order that seemed immutable. Like every myth of the given, a stable foundation is fabulated for a real world of chaos, violence, and

doubt. The 'given' is sequestered into the private realm as a certainty, whilst retreating on fronts of public consequences. When the possibility of transition became real and known, the tomb under Nature's shrine cracked, and new histories -- bristling with futures -- escaped the old order of 'sex'. The disciplinary grid of gender is in no small part an attempt to mend that shattered foundation, and tame the lives that escaped it. The time has now come to tear down this shrine entirely, and not bow down before it in a piteous apology for what little autonomy has been won.

0x0C If 'cyberspace' once offered the promise of escaping the strictures of essentialist identity categories, the climate of contemporary social media has swung forcefully in the other direction, and has become a theatre where these prostrations to identity are performed. With these curatorial practices come puritanical rituals of moral maintenance, and these stages are too often overrun with the disavowed pleasures of accusation, shaming, and denunciation. Valuable platforms for connection, organization, and skill-sharing become clogged with obstacles to productive debate positioned as if they are debate. These puritanical politics of shame -- which fetishize oppression as if it were a blessing, and cloud the waters in moralistic frenzies -- leave us cold. We want neither clean hands nor beautiful souls, neither virtue nor terror. We want superior forms of corruption.

What this shows is that the task of engineering platforms for social emancipation and organization cannot ignore the cultural and semiotic mutations these platforms afford. What requires reengineering are the memetic parasites arousing and coordinating behaviours in ways occluded by their hosts' self-image; failing this, memes like 'anonymity', 'ethics', 'social justice' and 'privilege-checking' host social dynamisms at odds with the often-commendable intentions with which they're taken up. The task of collective self-mastery requires a hyperstitional manipulation of desire's puppet-strings, and deployment of semiotic operators over a terrain of highly networked cultural systems. The will will always be corrupted by the memes in which it traffics, but nothing prevents us from instrumentalizing this fact, and calibrating it in view of the ends it desires.

PARITY

Xenofeminism is gender-abolitionist. 'Gender abolitionism' is not code for the eradication of what are currently considered 'gendered' traits from the human population. Under patriarchy, such a project could only spell disaster -- the notion of what is 'gendered' sticks disproportionately to the feminine. But even if this balance were redressed, we have no interest in

seeing the sexual diversity of the world reduced. Let a hundred sexes bloom! 'Gender abolitionism' is shorthand for the ambition to construct a society where traits currently assembled under the rubric of gender, no longer furnish a grid for the asymmetric operation of power. 'Race abolitionism' expands into a similar formula -- that the struggle must continue until currently racialized characteristics are no more a basis of discrimination than the color of one's eyes. Ultimately, every emancipatory abolitionism must incline towards the horizon of class abolitionism, since it is in capitalism where we encounter oppression in its transparent, denaturalized form: you're not exploited or oppressed because you are a wage labourer or poor; you are a labourer or poor because you are exploited.

Xenofeminism understands that the viability of emancipatory abolitionist projects -- the abolition of class, gender, and race -- hinges on a profound reworking of the universal. The universal must be grasped as generic, which is to say, intersectional. Intersectionality is not the morcellation of collectives into a static fuzz of cross-referenced identities, but a political orientation that slices through every particular, refusing the crass pigeonholing of bodies. This is not a universal that can be imposed from above, but built from the bottom up --

or, better, laterally, opening new lines of transit across an uneven landscape. This non-absolute, generic universality must guard against the facile tendency of conflation with bloated, unmarked particulars -- namely Eurocentric universalism -- whereby the male is mistaken for the sexless, the white for raceless, the cis for the real, and so on. Absent such a universal, the abolition of class will remain a bourgeois fantasy, the abolition of race will remain a tacit white-supremacism, and the abolition of gender will remain a thinly veiled misogyny, even -- especially -- when prosecuted by avowed feminists themselves. (The absurd and reckless spectacle of so many self-proclaimed 'gender abolitionists' campaign against trans women is proof enough of this.)

0x10 From the postmoderns, we have learnt to burn the facades of the false universal and dispel such confusions; from the moderns, we have learnt to sift new universals from the ashes of the false. Xenofeminism seeks to construct a coalitional politics, a politics without the infection of purity. Wielding the universal requires thoughtful qualification and precise self-reflection so as to become a ready-to-hand tool for multiple political bodies and something that can be appropriated against the numerous oppressions that transect with gender and sexuality. The universal is no blueprint, and rather than dictate its uses in advance, we propose XF as a

platform. The very process of construction is therefore understood to be a negentropic, iterative, and continual refashioning. Xenofeminism seeks to be a mutable architecture that, like open source software, remains available for perpetual modification and enhancement following the navigational impulse of militant ethical reasoning. Open, however, does not mean undirected. The most durable systems in the world owe their stability to the way they train order to emerge as an 'invisible hand' from apparent spontaneity; or exploit the inertia of investment and sedimentation. We should not hesitate to learn from our adversaries or the successes and failures of history. With this in mind, XF seeks ways to seed an order that is equitable and just, injecting it into the geometry of freedoms these platforms afford.

ADJUST

0x11 Our lot is cast with technoscience, where nothing is so sacred that it cannot be reengineered and transformed so as to widen our aperture of freedom, extending to gender and the human. To say that nothing is sacred, that nothing is transcendent or protected from the will to know, to tinker and to hack, is to say that nothing is supernatural. 'Nature' -- understood here, as the unbounded arena of science -- is all there is. And so, in tearing

down melancholy and illusion; the unambitious and the non-scaleable; the libidinized puritanism of certain online cultures, and Nature as an un-remakeable given, we find that our normative anti-naturalism has pushed us towards an unflinching ontological naturalism. There is nothing, we claim, that cannot be studied scientifically and manipulated technologically.

0x12 This does not mean that the distinction between the ontological and the normative, between fact and value, is simply cut and dried. The vectors of normative anti-naturalism and ontological naturalism span many ambivalent battlefields. The project of untangling what ought to be from what is, of dissociating freedom from fact, will from knowledge, is, indeed, an infinite task. There are many lacunae where desire confronts us with the brutality of fact, where beauty is indissociable from truth. Poetry, sex, technology and pain are incandescent with this tension we have traced. But give up on the task of revision, release the reins and slacken that tension, and these filaments instantly dim.

CARRY

0x13 The potential of early, text-based internet culture for countering

repressive gender regimes, generating solidarity among marginalised groups, and creating new spaces for experimentation that ignited cyberfeminism in the nineties has clearly waned in the twenty-first century. The dominance of the visual in today's online interfaces has reinstated familiar modes of identity policing, power relations and gender norms in self-representation. But this does not mean that cyberfeminist sensibilities belong to the past. Sorting the subversive possibilities from the oppressive ones latent in today's web requires a feminism sensitive to the insidious return of old power structures, yet savvy enough to know how to exploit the potential. Digital technologies are not separable from the material realities that underwrite them; they are connected so that each can be used to alter the other towards different ends. Rather than arguing for the primacy of the virtual over the material, or the material over the virtual, xenofeminism grasps points of power and powerlessness in both, to unfold this knowledge as effective interventions in our jointly composed reality.

0x14 Intervention in more obviously material hegemonies is just as crucial as intervention in digital and cultural ones. Changes to the built environment harbour some of the most significant possibilities in the reconfiguration of the horizons of women and queers. As the embodiment of ideological constellations, the production of space and the decisions we

make for its organization are ultimately articulations about 'us' and reciprocally, how a 'we' can be articulated. With the potential to foreclose, restrict, or open up future social conditions, xenofeminists must become attuned to the language of architecture as a vocabulary for collective choreo-graphy -- the coordinated writing of space.

0x15 From the street to the home, domestic space too must not escape our tentacles. So profoundly ingrained, domestic space has been deemed impossible to disembed, where the home as norm has been conflated with home as fact, as an un-remakeable given. Stultifying 'domestic realism' has no home on our horizon. Let us set sights on augmented homes of shared laboratories, of communal media and technical facilities. The home is ripe for spatial transformation as an integral component in any process of feminist futurity. But this cannot stop at the garden gates. We see too well that reinventions of family structure and domestic life are currently only possible at the cost of either withdrawing from the economic sphere -- the way of the commune -- or bearing its burdens manyfold -- the way of the single parent.

If we want to break the inertia that has kept the moribund figure of the nuclear family unit in place, which has stubbornly worked to isolate women from the public sphere, and men from the lives of their children, while penalizing those who stray from it, we must overhaul the material infrastructure and break the economic cycles that lock it in place. The task before us is twofold, and our vision necessarily stereoscopic: we must

engineer an economy that liberates reproductive labour and family life, while building models of familiarity free from the deadening grind of wage labour.

From the home to the body, the articulation of a proactive politics for biotechnical intervention and hormones presses. Hormones hack into gender systems possessing political scope extending beyond the aesthetic calibration of individual bodies. Thought structurally, the distribution of hormones -- who or what this distribution prioritizes or pathologizes -- is of paramount import. The rise of the internet and the hydra of black market pharmacies it let loose -- together with a publicly accessible archive of endocrinological knowhow -- was instrumental in wresting control of the hormonal economy away from 'gatekeeping' institutions seeking to mitigate threats to established distributions of the sexual. To trade in the rule of bureaucrats for the market is, however, not a victory in itself. These tides need to rise higher. We ask whether the idiom of 'gender hacking' is extensible into a long-range strategy, a strategy for wetware akin to what hacker culture has already done for software -- constructing an entire universe of free and open source platforms that is the closest thing to a practicable communism many of us have ever seen. Without the foolhardy endangerment of lives, can we stitch together the embryonic promises held before us by pharmaceutical 3D printing ('Reactionware'),

grassroots telemedical abortion clinics, gender hacktivist and DIY-HRT forums, and so on, to assemble a platform for free and open source medicine?

0x17 From the global to the local, from the cloud to our bodies, xenofeminism avows the responsibility in constructing new institutions of technomaterialist hegemonic proportions. Like engineers who must conceive of a total structure as well as the molecular parts from which it is constructed, XF emphasises the importance of the mesopolitical sphere against the limited effectiveness of local gestures, creation of autonomous zones, and sheer horizontalism, just as it stands against transcendent, or top-down impositions of values and norms. The mesopolitical arena of xenofeminism's universalist ambitions comprehends itself as a mobile and intricate network of transits between these polarities. As pragmatists, we invite contamination as a mutational driver between such frontiers.

OVERFLOW

0x18 XF asserts that adapting our behaviour for an era of Promethean complexity is a labour requiring patience, but a ferocious patience at odds with 'waiting'. Calibrating a political hegemony or insurgent memeplex not only implies the creation of material infra-structures to make the values it articulates explicit, but places demands on us as subjects. How are we to

become hosts of this new world? How do we build a better semiotic parasite -- one that arouses the desires we want to desire, that orchestrates not an autophagic orgy of indignity or rage, but an emancipatory and egalitarian community buttressed by new forms of unselfish solidarity and collective self-mastery?

0x19 Is xenofeminism a programme? Not if this means anything so crude as a recipe, or a single-purpose tool by which a determinate problem is solved. We prefer to think like the schemer or lisper, who seeks to construct a new language in which the problem at hand is immersed, so that solutions for it, and for any number of related problems, might unfurl with ease. Xenofeminism is a platform, an incipient ambition to construct a new language for sexual politics -- a language that seizes its own methods as materials to be reworked, and incrementally bootstraps itself into existence. We understand that the problems we face are systemic and interlocking, and that any chance of global success depends on infecting myriad skills and contexts with the logic of XF. Ours is a transformation of seeping, directed subsumption rather than rapid overthrow; it is a transformation of deliberate

construction, seeking to submerge the white-supremacist capitalist patriarchy in a sea of procedures that soften its shell and dismantle its defenses, so as to build a new world from the scraps.

0x1A Xenofeminism indexes the desire to construct an alien future with a triumphant X on a mobile map. This X does not mark a destination. It is the

insertion of a topological-keyframe for the formation of a new logic. In affirming a future untethered to the repetition of the present, we militate for ampliative capacities, for spaces of freedom with a richer geometry than the aisle, the assembly line, and the feed. We need new affordances of perception and action unblinkered by naturalised identities. In the name of feminism, 'Nature' shall no longer be a refuge of injustice, or a basis for any political justification whatsoever!

If nature is unjust, change nature!

Erectus is Behind Us!:

Critiques of the Deep Terrestrials

Mystifying the Primitive

From: Social Anarchism or Lifestyle Anarchism by Murray Bookchin

The corollary of antitechnologism and anticivilizationism is primitivism, an edenic glorification of prehistory and the desire to somehow return to its putative innocence. Lifestyle anarchists like Bradford draw their inspiration from aboriginal peoples and myths of an edenic prehistory. Primal peoples, he says, 'refused technology' -- they 'minimized the relative weight of instrumental or practical techniques and expanded the importance of . . . ecstatic techniques.' This was because aboriginal peoples, with their animistic beliefs, were saturated by a 'love' of animal life and wilderness -- for them, 'animals, plants, and natural objects' were 'persons, even kin' (CIB, p. 11).

Accordingly, Bradford objects to the 'official' view that designates the lifeways of prehistoric foraging cultures as 'terrible, brutish and nomadic, a bloody struggle for existence.' Rather, he apotheosizes 'the primal world' as what Marshall Sahlins called 'the original affluent society,' affluent because its needs are few, all its desires are easily met. Its tool kit is elegant and light-weight, its outlook linguistically complex and conceptually profound yet simple and accessible to all. Its culture is expansive and ecstatic. It is propertyless and communal, egalitarian and cooperative. . . . It is anarchic. .

. . free of work . . . It is a dancing society, a singing society, a celebrating society, a dreaming society. (CIB, p. 10)

Inhabitants of the 'primal world,' according to Bradford, lived in harmony with the natural world and enjoyed all the benefits of affluence, including much leisure time. Primal society, he emphasizes, was 'free of work' since hunting and gathering required much less effort than people today put in with the eight-hour day. He does compassionately concede that primal society was 'capable of experiencing occasional hunger.' This 'hunger,' however, was really symbolic and self-inflicted, you see, because primal peoples 'sometimes [chose] hunger to enhance interrelatedness, to play, or to see visions' (CIB, p. 10).

It would take a full-sized essay in itself to unscramble, let alone refute, this absurd balderdash, in which a few truths are either mixed with or coated in sheer fantasy. Bradford bases his account, we are told, on 'greater access to the views of primal people and their native descendants' by 'a more critical . . . anthropology' (CIB, p. 10). In fact, much of his 'critical anthropology' appears to derive from ideas propounded at the 'Man the Hunter' symposium, convened in April 1966 at the University of Chicago. Although most of the papers contributed to this symposium were immensely valuable, a number of them conformed to the naive mystification of 'primitivity' that was percolating through the 1960s counterculture -- and that lingers on to this day. The hippie culture, which influenced quite a few anthropologists of the time, averred that hunting-gathering peoples today had been bypassed by the social and economic forces at work in the rest of the world and still lived in a pristine state, as isolated remnants of Neolithic and

Paleolithic lifeways. Further, as hunter-gatherers, their lives were notably healthy and peaceful, living then as now on an ample natural largess.

Thus, Richard B. Lee, coeditor of the collection of conference papers, estimated that the caloric intake of 'primitive' peoples was quite high and their food supply abundant, making for a kind of virginal 'affluence' in which people needed to forage only a few hours each day. 'Life in the state of nature is not necessarily nasty, brutish, and short,' wrote Lee. The habitat of the !Kung Bushmen of the Kalahari Desert, for example, 'is abundant in naturally occurring foods.' The Bushmen of the Dobe area, who, Lee wrote, were still on the verge of entry into the Neolithic, live well today on wild plants and meat, in spite of the fact that they are confined to the least productive portion of the range in which Bushmen peoples were formerly found. It is likely that an even more substantial subsistence base would have been characteristic of these hunters and gatherers in the past, when they had the pick of African habitats to choose from.

Not quite! -- as we shall see shortly.

It is all too common for those who swoon over 'primal life' to lump together many millennia of prehistory, as if significantly different hominid and human species lived in one kind of social organization. The word prehistory is highly ambiguous. Inasmuch as the human genus included several different species, we can hardly equate the 'outlook' of Aurignacian and Magdalenian foragers (*Homo sapiens sapiens*) some 30,000 years ago, with that of *Homo sapiens neanderthalensis* or *Homo erectus*, whose tool kits, artistic abilities, and capacities for speech were strikingly different.

Another concern is the extent to which prehistoric hunter-gatherers or foragers at various times lived in nonhierarchical societies. If the burials at Sungir (in present Eastern Europe) some 25,000 years ago allow for any speculation (and there are no Paleolithic people around to tell us about their lives), the extraordinarily rich collection of jewelry, lances, ivory spears, and beaded clothing at the gravesites of two adolescents suggest the existence of high-status family lines long before human beings settled down to food cultivation. Most cultures in the Paleolithic were probably relatively egalitarian, but hierarchy seems to have existed even in the late Paleolithic, with marked variations in degree, type, and scope of domination that cannot be subsumed under rhetorical paeans to Paleolithic egalitarianism.

A further concern that arises is the variation -- in early cases, the absence -- of communicative ability in different epochs. Inasmuch as a written language did not appear until well into historical times, the languages even of early *Homo sapiens sapiens* were hardly 'conceptually profound.' The pictographs, glyphs, and, above all, memorized material upon which 'primal' peoples relied for knowledge of the past have obvious cultural limitations. Without a written literature that records the cumulative wisdom of generations, historical memory, let alone 'conceptually profound' thoughts, are difficult to retain; rather, they are lost over time or woefully distorted. Least of all is orally transmitted history subject to demanding critique but instead easily becomes a tool for elite 'seers' and shamans who, far from being 'protopoets,' as Bradford calls them, seem to have used their 'knowledge' to serve their own social interests.

Which brings us, inevitably, to John Zerzan, the anti'civiliza'tional primitivist par excellence. For Zerzan, one of the steady hands at *Anarchy: A Journal of Desire Armed*, the absence of speech, language, and writing is a positive boon. Another denizen of the 'Man the Hunter' time warp, Zerzan maintains in his book *Future Primitive* (FP) that 'life before domestication/agriculture was in fact largely one of a leisure, intimacy with nature, sensual wisdom, sexual equality, and health' -- with the difference that Zerzan's vision of 'primalty' more closely approximates four-legged animality. In fact, in Zerzanian paleoanthropology, the anatomical distinctions between *Homo sapiens*, on the one hand, and *Homo habilis*, *Homo erectus*, and the 'much-maligned' Neanderthals, on the other, are dubious; all early *Homo* species, in his view, were possessed of the mental and physical capacities of *Homo sapiens* and furthermore lived in primal bliss for more than two million years.

If these hominids were as intelligent as modern humans, we may be naively tempted to ask, why did they not innovate tech'no'logical change? 'It strikes me as very plausible,' Zerzan brightly conjectures, 'that intelligence, informed by the success and satisfaction of a gatherer-hunter existence, is the very reason for the pronounced absence of 'progress.' Division of labor, domestication, symbolic culture -- these were evidently [!] refused until very recently.' The *Homo* species 'long chose nature over culture,' and by culture here Zerzan means 'the manipulation of basic symbolic forms' (emphasis added) -- an alienating encumbrance. Indeed, he continues, 'reified time, language (written, certainly, and probably spoken language for all or most of this period), number, and art had no place, despite an intelligence fully capable of them' (FP, pp. 23, 24).

In short, hominids were capable of symbols, speech, and writing but deliberately rejected them, since they could understand one another and their environment instinctively, without recourse to them. Thus Zerzan eagerly agrees with an anthropologist who meditates that 'San/Bushman communion with nature' reached 'a level of experience that 'could almost be called mystical. For instance, they seemed to know what it actually felt like to be an elephant, a lion, an antelope" even a baobab tree (FP, pp. 33-34).

The conscious 'decision' to refuse language, sophisticated tools, temporality, and a division of labor (presumably they tried and grunted, 'Bah!') was made, we are told, by *Homo habilis*, who, I should note, had roughly half the brain size of modern humans and probably lacked the anatomical capacity for syllabic speech. Yet we have it on Zerzan's sovereign authority that *habilis* (and possibly even *Australopithecus afarensis*, who may have been around some 'two million years ago') possessed 'an intelligence fully capable' -- no less! -- of these functions but refused to use them. In Zerzanian paleoanthropology, early hominids or humans could adopt or reject vital cultural traits like speech with sublime wisdom, the way monks take vows of silence.

But once the vow of silence was broken, everything went wrong! For reasons known only to God and Zerzan.

The emergence of symbolic culture, with its inherent will to manipulate and control, soon opened the door to the domestication of nature. After two million years of human life within the bounds of nature, in balance with other wild species, agriculture changed our lifestyle, our way of adapting, in an unprecedented way. Never before has such a

radical change occurred in a species so utterly and so swiftly. . . . Self-domestication through language, ritual, and art inspired the taming of plants and animals that followed. (FP, pp. 27-28, emphasis added)

There is a certain splendor in this claptrap that is truly arresting. Significantly different epochs, hominid and/or human species, and ecological and technological situations are all swept up together into a shared life 'within the bounds of nature.' Zerzan's simplification of the highly complex dialectic between humans and nonhuman nature reveals a mentality so reductionist and simplistic that one is obliged to stand before it in awe.

To be sure, there is very much we can learn from preliterate cultures -- organic societies, as I call them in *The Ecology of Freedom* -- particularly about the mutability of what is commonly called 'human nature.' Their spirit of in-group cooperation and, in the best of cases, egalitarian outlook are not only admirable -- and socially necessary in view of the precarious world in which they lived -- but provide compelling evidence of the malleability of human behavior in contrast to the myth that competition and greed are innate human attributes. Indeed, their practices of usufruct and the inequality of equals are of great relevance to an ecological society.

But that 'primal' or prehistoric peoples 'revered' nonhuman nature is at best specious and at worst completely disingenuous. In the absence of 'nonnatural' environments such as villages, towns, and cities, the very notion of 'Nature' as distinguished from habitat had yet to be conceptualized -- a truly alienating experience, in Zerzan's view. Nor is it likely that our remote ancestors viewed the natural world in a manner any less instrumental

than did people in historical cultures. With due regard for their own material interests -- their survival and well-being -- prehistoric peoples seem to have hunted down as much game as they could, and if they imaginatively peopled the animal world with anthropomorphic attributes, as they surely did, it would have been to communicate with it with an end toward manipulating it, not simply toward revering it.

Thus, with very instrumental ends in mind, they conjured 'talking' animals, animal 'tribes' (often patterned on their own social structures), and responsive animal 'spirits.' Understandably, given their limited knowledge, they believed in the reality of dreams, where humans might fly and animals might talk -- in an inexplicable, often frightening dream world that they took for reality. To control game animals, to use a habitat for survival purposes, to deal with the vicissitudes of weather and the like, prehistoric peoples had to personify these phenomena and 'talk' to them, whether directly, ritualistically, or metaphorically.

In fact, prehistoric peoples seem to have intervened into their environment as resolutely as they could. As soon as *Homo erectus* or later human species learned to use fire, for example, they seem to have put it to work burning off forests, probably stampeding game animals over cliffs or into natural enclosures where they could be easily slaughtered. The 'reverence for life' of prehistoric peoples thus reflected a highly pragmatic concern for enhancing and controlling the food supply, not a love for animals, forests, mountains (which they may very well have feared as the lofty home of deities both demonic and benign).

Nor does the 'love of nature' that Bradford attributes to 'primal society' accurately depict foraging peoples today, who often deal rather harshly with work and game animals; the Ituri forest Pygmies, for example, tormented ensnared game quite sadistically, and Eskimos commonly maltreated their huskies. As for Native Americans before European contact, they vastly altered much of the continent by using fire to clear lands for horticulture and for better visibility in hunting, to the extent that the 'paradise' encountered by Europeans was 'clearly humanized.'

Unavoidably, many Indian tribes seem to have exhausted local food animals and had to migrate to new territories to gain the material means of life. It would be surprising indeed if they did not engage in warfare to displace the original occupants. Their remote ancestors may well have pushed some of the great North American mammals of the last ice age (notably mammoths, mastodons, longhorn bison, horses, and camels) to extinction. Thickly accumulated bones of bison are still discernible in sites that suggest mass killings and 'assembly-line' butchering in a number of American arroyos.

Nor, among those peoples who did have agriculture, was land use necessarily ecologically benign. Around Lake P'itzcuaro in the central Mexican highlands, before the Spanish conquest, 'prehistoric land use was not conservationist in practice,' writes Karl W. Butzer, but caused high rates of soil erosion. Indeed, aboriginal farming practices 'could be as damaging as any pre-industrial land-use in the Old World.' Other studies have shown that forest overclearing and the failure of subsistence agriculture undermined Mayan society and contributed to its collapse.

We will never have any way of knowing whether the lifeways of today's foraging cultures accurately mirror those of our ancestral past. Not only did modern aboriginal cultures develop over thousands of years, but they were significantly altered by the diffusion of countless traits from other cultures before they were studied by Western researchers. Indeed, as Clifford Geertz has observed rather acidly, there is little if anything pristine about the aboriginal cultures that modern primitivists associate with early humanity. 'The realization, grudging and belated, that [the pristine primality of existing aborigines] is not so, not even with the Pygmies, not even with the Eskimos,' Geertz observes, 'and that these people are in fact products of larger-scale processes of social change which have made them and continue to make them what they are -- has come as something of a shock that has induced a virtual crisis in the field [of ethnography].' Scores of 'primal' peoples, like the forests they inhabited, were no more 'virginal' at European contact than were the Lakota Indians at the time of the American Civil War, *Dancing With Wolves* to the contrary notwithstanding. Many of the much-touted 'primal' belief-systems of existing aborigines are clearly traceable to Christian influences. Black Elk, for example, was a zealous Catholic, while the late-nineteenth-century Ghost Dance of the Paiute and Lakota was profoundly influenced by Christian evangelical millennialism.

In serious anthropological research, the notion of an 'ecstatic,' pristine hunter has not survived the thirty years that have passed since the 'Man the Hunter' symposium. Most of the 'affluent hunter' societies cited by devotees of the myth of 'primitive affluence' literally devolved -- probably very much against their desires -- from horticultural social systems. The San people of the Kalahari are now known to have been gardeners before they were driven into the desert. Several hundred years ago, according to Edwin Wilmsen, San-speaking peoples were herding and farming, not to speak of trading with

neighboring agricultural chiefdoms in a network that extended to the Indian Ocean. By the year 1000, excavations have shown, their area, Dobe, was populated by people who made ceramics, worked with iron, and herded cattle, exporting them to Europe by the 1840s together with massive amounts of ivory -- much of it from elephants hunted by the San people themselves, who doubtless conducted this slaughter of their pachyderm 'brothers' with the great sensitivity that Zerzan attributes to them. The marginal foraging lifeways of the San that so entranced observers in the 1960s were actually the result of economic changes in the late nineteenth century, while 'the remoteness imagined by outside observers . . . was not indigenous but was created by the collapse of mercantile capital.' Thus, 'the current status of San-speaking peoples on the rural fringe of African economies,' Wilmsen notes, can be accounted for only in terms of the social policies and economies of the colonial era and its aftermath. Their appearance as foragers is a function of their relegation to an underclass in the playing out of historical processes that began before the current millennium and culminated in the early decades of this century.

The Yuqu' of the Amazon, too, could easily have epitomized the pristine foraging society extolled in the 1960s. Unstudied by Europeans until the 1950s, this people had a tool kit that consisted of little more than a boar claw and bow-and-arrows: 'In addition to being unable to produce fire,' writes Allyn M. Stearman, who studied them, 'they had no watercraft, no domestic animals (not even the dog), no stone, no ritual specialists, and only a rudimentary cosmology. They lived out their lives as nomads, wandering the forests of lowland Bolivia in search of game and other foods provided by their foraging skills.' They grew no crops at all and were unfamiliar with the use of the hook and line for fishing.

Yet far from being egalitarian, the Yuqu' maintained the institution of hereditary slavery, dividing their society into a privileged elite stratum and a scorned laboring slave group. This feature is now regarded as a vestige of former horticultural lifeways. The Yuqu', it appears, were descended from a slave-holding pre-Columbian society, and 'over time, they experienced deculturation, losing much of their cultural heritage as it became necessary to remain mobile and live off the land. But while many elements of their culture may have been lost, others were not. Slavery, evidently, was one of these.'

Not only has the myth of the 'pristine' forager been shattered, but Richard Lee's own data on the caloric intake of 'affluent' foragers have been significantly challenged by Wilmsen and his associates. !Kung people had average lifespans of about thirty years. Infant mortality was high, and according to Wilmsen (pace Bradford!), the people were subject to disease and hunger during lean seasons. (Lee himself has revised his views on this score since the 1960s.)

Correspondingly, the lives of our early ancestors were most certainly anything but blissful. In fact, life for them was actually quite harsh, generally short, and materially very demanding. Anatomical assays of their longevity show that about half died in childhood or before the age of twenty, and few lived beyond their fiftieth year. They were more likely scavengers than hunter-gatherers and were probably prey for leopards and hyenas.

To members of their own bands, tribes, or clans, prehistoric and later foraging peoples were normally cooperative and peaceful; but toward members of other bands, tribes, or clans, they were often warlike, even sometimes genocidal in their efforts to dispossess

them and appropriate their land. That most blissed-out of ancestral humans (if we are to believe the primitivists), *Homo erectus*, has left behind a bleak record of interhuman slaughter, according to data summarized by Paul Janssens. It has been suggested that many individuals in China and Java were killed by volcanic eruptions, but the latter explanations loses a good deal of plausibility in the light of the remains of forty individuals whose mortally injured heads were decapitated -- 'hardly the action of a volcano,' Corinne Shear Wood observes dryly. As to modern foragers, the conflicts between Native American tribes are too numerous to cite at any great length -- as witness the Anasazi and their neighbors in the Southwest, the tribes that were to finally make up the Iroquois Confederacy (the Confederacy itself was a matter of survival if they were not to all but exterminate one another), and the unrelenting conflict between Mohawks and Hurons, which led to the near extermination and flight of remanent Huron communities.

If the 'desires' of prehistoric peoples 'were easily met,' as Bradford alleges, it was precisely because their material conditions of life -- and hence their desires -- were very simple indeed. Such might be expected of any life-form that largely adapts rather than innovates, that conforms to its pregiven habitat rather than alters it to make that habitat conform with its own wants. To be sure, early peoples had a marvelous understanding of the habitat in which they lived; they were, after all, highly intelligent and imaginative beings. Yet their 'ecstatic' culture was unavoidably riddled not only by joy and 'singing . . . celebrating . . . dreaming,' but by superstition and easily 'manipulable fears.

Neither our remote ancestors nor existing aborigines could have survived if they held the 'enchanted' Disneyland ideas imputed to them by present-day primitivists. Certainly,

Europeans offered aboriginal peoples no magnificent social dispensation. Quite to the contrary: imperialists subjected native peoples to crass exploitation, outright genocide, diseases against which they had no immunity, and shameless plunder. No animistic conjurations did or could have prevented this onslaught, as at the tragedy of Wounded Knee in 1890, where the myth of ghost shirts impregnable to bullets was so painfully belied.

What is of crucial importance is that the regression to primitivism among lifestyle anarchists denies the most salient attributes of humanity as a species and the potentially emancipatory aspects of Euro-American civilization. Humans are vastly different from other animals in that they do more than merely adapt to the world around them; they innovate and create a new world, not only to discover their own powers as human beings but to make the world around them more suitable for their own development, both as individuals and as a species. Warped as this capacity is by the present irrational society, the ability to change the world is a natural endowment, the product of human biological evolution -- not simply a product of technology, rationality, and civilization. That people who call themselves anarchists should advance a primitivism that verges on the animalistic, with its barely concealed message of adaptiveness and passivity, sullies centuries of revolutionary thought, ideals, and practice, indeed defames the memorable efforts of humanity to free itself from parochialism, mysticism, and superstition and change the world.

For lifestyle anarchists, particularly of the anticivilizational and primitivistic genre, history itself becomes a degrading monolith that swallows up all distinctions, mediations, phases of development, and social specificities. Capitalism and its

contradictions are reduced to epiphenomena of an all-devouring civilization and its technological 'imperatives' that lack nuance and differentiation. History, insofar as we conceive it as the unfolding of humanity's rational component -- its developing potentiality for freedom, self-consciousness, and cooperation -- is a complex account of the cultivation of human sensibilities, institutions, intellectuality, and knowledge, or what was once called 'the education of humanity.' To deal with history as a steady 'Fall' from an animalistic 'authenticity,' as Zerzan, Bradford, and their compatriots do in varying degrees in a fashion very similar to that of Martin Heidegger, is to ignore the expanding ideals of freedom, individuality, and self-consciousness that have marked epochs of human development -- not to speak of the widening scope of the revolutionary struggles to achieve these ends.

Anticivilizational lifestyle anarchism is merely one aspect of the social regression that marks the closing decades of the twentieth century. Just as capitalism threatens to unravel natural history by bringing it back to a simpler, less differentiated geological and zoological era, so anticivilizational lifestyle anarchism is complicit with capitalism in bringing the human spirit and its history back to a less developed, less determinate, pre'lapsarian world -- the supposedly 'innocent' pretechnological and precivilizational society that existed before humanity's 'fall from grace.' Like the Lotus Eaters in Homer's *Odyssey*, humans are 'authentic' when they live in an eternal present, without past or future -- untroubled by memory or ideation, free of tradition, and unchallenged by becoming.

Ironically, the world idealized by primitivists would actually preclude the radical individualism celebrated by the individualist heirs of Max Stirner. Although

contemporary 'primal' communities have produced strongly etched individuals, the power of custom and the high degree of group solidarity impelled by demanding conditions allow little leeway for expansively individualistic behavior, of the kind demanded by Stirnerite anarchists who celebrate the supremacy of the ego. Today, dabbling in primitivism is precisely the privilege of affluent urbanites who can afford to toy with fantasies denied not only to the hungry and poor and to the 'nomads' who by necessity inhabit urban streets but to the overworked employed. Modern working women with children could hardly do without washing machines to relieve them, however minimally, from their daily domestic labors -- before going to work to earn what is often the greater part of their households' income. Ironically, even the collective that produces Fifth Estate found it could not do without a computer and was 'forced' to purchase one -- issuing the disingenuous disclaimer, 'We hate it!' Denouncing an advanced technology while using it to generate antitechnological literature is not only disingenuous but has sanctimonious dimensions: Such 'hatred' of computers seems more like the belch of the privileged, who, having overstuffed themselves with delicacies, extol the virtues of poverty during Sunday prayers.

On the Stalin Question by J. Posadas

The USSR decomposes if it does not base itself on the world revolutionary process. Even with all its bureaucracy, it cannot live on without lending support to revolutionary movements. Stalin could not live with the Revolution, but the Soviet Union cannot live without stimulating the revolutionary process. The Soviet Union doesn't always lend support at the right time or take the best steps. In the end however, it must lend support to the anti-capitalist movements. The USSR goes on negotiating with capitalism, but it can no longer surrender any revolution of importance, or of medium importance. The Soviet leaders negotiate with capitalism to keep the status quo, but the condition for the continued existence of the USSR is that it must progress; and to progress, it must side with any movement looking up to it, and encourage there structures tending towards the Workers State. This is the logical condition of history. We are guided in this matter by the logic of history, and not by the perceived intentions of the Soviet leaders. By 'logic of history' we mean that the Soviet Union can only continue living by impelling the Revolution. It is the condition for its continued existence. Since its inception, the Soviet Union needed to shore itself up against the capitalist system. This became very marked after the Second World War, but it was only after the liquidation of Stalin that the Soviet leaders gained confidence in this matter. It is not very important to know how Stalin was liquidated. Whether he died or was killed, it is history that killed him. His staunch opposition to the development of the Workers State was in the way of history. For one Workers State can only make progress by assisting revolutions and impelling new ones. Not to swallow them up, mind, but to shore up the Workers States' camp in relation to capitalism! What has changed in today's world (1981) is that the USSR must take world positions that end up imposing their logic on the Soviet bureaucracy itself. This logic weighs much less on the bureaucracies of the other Workers States (and Communist parties) because their usurper way of thinking is not challenged in the same way. The

usurper's mentality continues in the USSR too, but to a lesser extent, because the USSR must stimulate the world revolution. One should expect, and quite soon, that the Soviets will start correcting their methods of analysis. They may even offer plans of anti-capitalist struggle and start trying to influence the world Communist parties. The latter have retained many of the direct structures built in the epoch of Stalin. Such is the case with the Italian, French and Spanish Communist parties where renovation is particularly slow. This applies less to the Communist Party of the Soviet Union (CPSU) because it eventually repudiated Stalin. First the Soviet Union liquidated Stalin as a figurehead, then it liquidated him as a thought-method and now it liquidates his policy. It has not overcome Stalin entirely, but what it retains of him is no longer representative of the USSR as it has become. The renovation happening in the Soviet Union takes the very simple and sensible forms dictated by the need to progress. Because the continuation of the Soviet Union as a Workers State depends upon this, the Soviet Union has become the most receptive country in the world to the call of progress. Hearing no such call, the Italian Communist Party carries on mostly with its political manoeuvrings and parliamentary games. As the USSR must progress, the Soviet leaders themselves feel the concrete need to confront the capitalist system. This leads them to improve the policies of the USSR and to remove political layers of internal opponents. Those changes in the USSR are still slow, and those in the Communist movement even slower, but they are changes. Such changes modify the manner in which the Political Revolution and the Permanent Revolution unfold. The principles of Permanent Revolution and Political Revolution are still valid, but they develop differently from before. The world Communist parties have not yet changed very much. It is necessary to intervene towards them to show them the need to do so. One must expect that the new and major struggles to come are going to weigh on them, stimulate their progressive tendencies and force a fight against their centrists and rightists. We aim at helping these progressive comrades

to advance in their parties, and to win. One thing we already say to them is: 'Never break with the Soviet Union! Support its advances!' Some Communists are already discussing this. Pajetta (Italian Communist) spoke as a delegate at the 16th Congress of the CPSU along those lines. He also praised Brezhnev for some "good things", which is new. Helping the Communists to support the Soviet Union is part of our task. We do this with complete patience and dedication. This is why our movement does not grow in numbers, but it grows in authority everywhere in the world. We are not in a hurry, and we are not impatient. Haste and impatience come from a lack of maturity, and a lack of maturity comes from not understanding the process and how it unfolds. The world revolutionary process has many and varied forms that must be understood. The world revolutionary movements force the Communist parties leftwards. This too influences the Soviet Union, giving it a greater political and organisational security. The reward for the comprehension of such aspects is a deepening level of theoretical security.

Comprehension needs the backing of theoretical security, and these two abilities come with the practice of theory, so to say. In the practice of theory, one realises that historic truth can only be defended in the moving process. Not the truth in abstract like a placard or an emblem, but truth in the development where to uphold one truth means to uphold all the truths. The historic basis for doing this lays in reasoning and drawing conclusions. Such is the fight for the harmonious development of humanity, to finish with every form of exploitation, violence and necessity. Theoretical preparation and practical theoretical application lend the ability to reason and convince against any number of forces, material or numerical. This is the way to build theoretical and political security, starting within ourselves, and as a guide to reasoning. None of this can be done without Marxism. It is necessary to interest comrades in these quite complicated principles, which are also the most profound, and to do this in the simplest possible ways. For my part, I feel that I learn and correct myself as I teach all this.

Nuclear War is not the End of the World: It is an Atomic Charco¹

by J. Posadas

The question of the atomic war is one of the overriding themes that dominate the preoccupation of the human beings, of the proletariat. This preoccupation, however, is not the same as fear. The concern is: How are we to face this? What will happen before, during and after? How will humanity behave?

In the matter of the atomic war, as in any other situation of calamity and class struggle, one must cling with great firmness to the class analyses, class conclusions and class experiences that put their entire trust in the proletariat and in humanity.

Although the atomic war petrifies the bourgeoisie, the latter will launch it all the same. The bourgeoisie senses that the atomic war is ‘curtains’ for it – and this cripples it with fear. In the United States and other countries, it makes shelters for itself hundreds of meters belowground, with cinemas, generators, bathrooms and domestic servants’ quarters. Bourgeois people may take refuge in there, but capitalist power will end, even if imperialism wins the war. Imperialism winning the war would bring new conditions in history. Triumph and power would fall to military types who will oust the political leaders of private property. The retrogression will fling society back to the middle Ages, under a system of production inferior even to the middle Ages. The conditions will not exist to create a new form of property, and those in charge will have to fight in order not to be dispossessed. To live on, they will have to increase the use of science and technology, and today’s problems will return. There is no perspective for those people, even if they win the war.

1 The word ‘charco’ used by the author in its Argentinian version of Spanish has been left untranslated here for lack of a sufficiently evocative English word. The context of the author’s writings points to a traumatic quagmire, of a short duration.

We reiterate that we do not want the atomic war. The Bolshevik programme was against war. To those who asked the Bolsheviks why they were fighting, the Bolsheviks answered that their fight was “war against war”, to stop the oppression and the massacres of the class enemy. Did they have another option? Is there another option? Should someone discover another option, we will support it! But there is none. The atomic war is inevitable because imperialism is going to use all its weapons. Hence we prepare for it, counting on all the possible forces, like the 14 Workers States and 16 Revolutionary States that exist today.

As a class, the proletariat feels secure in history. It does not fear the atomic war. Its industrial and political preparation disposes it to revolutionary action, but it derives this disposition mainly from its role in society – regardless of Trade Union and political preparation. Through its function in the economy and in society, the proletariat sees that capitalism is unnecessary. The proletariat lives the daily reality of capitalism’s social role making no contribution to the human relations. Within itself, the proletariat feels that it is producing, reproducing and contributing usefully, whether the capitalists stand over it or not. The proletariat sees its labour as part of human ingeniousness. It feels part of the intelligence that elaborates science and technology. Although the proletariat realises that society depends upon it, it does not adopt the attitudes of superiority or arrogance to be found in the other social classes. In the other social classes, conservative and egoistical sentiments motivate their attitudes and social inclinations. The proletariat as a class cannot have such attitudes, motives or social inclinations, because it does not generate such sentiments.

The role that the proletariat plays in the economy guards it against conservatism and egoism. It knows that its effective labour is part of an endeavour that includes the technicians and scientists. It sees also that the capitalists operate right outside that endeavour, utilizing technology for themselves, just as they utilize science and human

labour. The proletariat knows that society and production depend upon it, in a way that would not change if there were no capitalists. This is why those in power experience any Trade Union proposal as a power duality, a bid for power, a casting out of the capitalist.

Due to its function in society and the economy, the proletariat feels confident and secure. Production having become increasingly socialised, this inner confidence has grown over time into an unfettered communist consciousness. In Roman times, the proletariat played a role too, but not as a class. It is capitalist development and big industry that developed the proletariat as a class. Big capitalist industry and collective production have given rise to collective consciousness. Collective consciousness arises from the socialised process of capitalist production, where a collective form of participation became necessary.

The proletariat feels fundamentally part of this. In its historic class development, proletarian consciousness evolved through Workers Parties that eventually led to the Bolshevik Party. At the time of the First International – and later with the Socialist parties – partial and limited aspects of this consciousness emerged. With the triumph of the Russian Revolution, the proletariat came to full consciousness through Communist Parties aware now that progress demanded the transformation of society.

The structure of society as it stands, along with its relations of production and exchange, makes any new form of private property impossible. The centralisation of property has given rise to a great technical capacity where each new level of concentration generates more productivity. Matters have now reached the point where this great concentration and centralisation simply need planning. With planning, productivity will be a hundred times what it is now. The obstacle in the way is private property and competition – that is to say, the market. The proletariat developed through those forms; and when Marxism arrived, it gave a consciousness that only the proletariat can have. The proletariat derives its ability from its function in society, as we said, but it derives it also from the Party. The collective consciousness of the proletariat mounts from the established form of

production up towards the Party. The Party then takes on the task of upholding it consciously and teaching it. The Party defends the historic notion and spreads the comprehension that the new society must start from the levels and structures attained in capitalism, i.e., from big and centralised production.

Human progress must start from the level of concentration and centralisation reached in capitalism. All it needs is a new form. What new form? The Workers State! And from the Workers State to Socialism! The proletariat is conscious; it feels secure. It does not fear catastrophes, economic mayhem or the destruction of the riches that humanity has produced. It feels like those who have nothing to lose. Its position in the economy clears its consciousness of egoistical conclusions.

The capitalists cannot live outside accumulation and profit-making

Capitalist society has concentrated the means of production. This has brought about big industrial development, high technology and high productivity. Capitalism knows how to produce more, in less time and at the same costs. If this talent were applied to a collective society, production would triple at once. It is only that, in capitalism, property is concentrated through competition and through the capitalists' implacable need to profit and accumulate. No capitalist can change this without going bankrupt. Any attempt at changing this breaks the M-C-M cycle (money-commodity-money). It is to keep this cycle going that the capitalists must preserve the existing social and economic order. Capital has reached the point where it can no longer boost its own capacity to expand. It reacts by turning in upon itself, increasing its financial centralisation. This lessens the number of capitalists because competition liquidates them.

Meanwhile, the Workers States continue to advance. They are plagued by a lack of means, of traditions and of preparation, but they can still resolve in 20 years what

capitalism never did in 200. The proletariat takes stock. It will start from that level of attainment when it finally breaks the bureaucratic yoke.

The proletariat is confident and secure in the notion that anything and everything can be rebuilt. Where the proletariat stands, society stands too, for society depends upon it. The proletariat occupies a place at the heart of production where there are no sentiments of egoism, appropriation, competition, vanity or selfishness. These sentiments are those of private property. When private property has gone, those sentiments will go too. The proletariat enters the war with these characteristics.

The proletariat has the historic and actual experience of 14 Workers States and 16 Revolutionary States. The Revolutionary States are influenced by the proletariat through the concept of the Workers State – i.e. State-owned property and the collectivised economy. That is to say, the world at large views the proletariat in light of the Workers States. The irrepressible confidence of the proletariat stems from its feeling socially irreplaceable. The proletariat is unafraid; it has nothing to lose “but its chains”, as Marx says.

Through its function as a class, the proletariat already feels itself to be organising history. It has no world Party, but it knows itself to be the decisive factor of social organisation. You get a measure of this when you look at its behaviour.

Its conduct in the Workers States is of a very fine order when you consider how it resists bureaucracy and takes great care not to harm the Workers State. This has been the conduct of the proletariat at every turn: in Germany in 1953, Hungary in 1958 and in Stettin & Dantzig (Poland) this year.

The proletariat enters the war with this ability and knowledge. It has nothing to lose and everything to gain. From where it has stood in history and in the economy, it has grown

the sort of confidence, resilience and determination that makes the rest of the population wish to follow it.

The atomic war is going to produce disarray, horror and shock. There will be a loss of reasoning in many people, but the proletariat will be the least affected. Those most affected will be the bourgeois whom you already see futureless and perspective-less, seeing nothing but death ahead. The bourgeois hope to secure their future by burying themselves 100 meters below the ground – where they will stay. A preview of how the proletariat is going to enter the nuclear war shows already in the conduct of the masses of Vietnam, of the Middle East, and of anywhere indeed. The proletariat gives constant demonstrations that it does not let itself be bullied, wiped out or debilitated. It is going to enter the atomic war with the all vigour it displays in the class struggle. The Yankees have threatened to use atomic weapons against Vietnam, but the proletariat did not quake. It went on supporting Vietnam and encouraged it to fight on.

The mayhem and monstrous capitalist crimes that will mark the start of the nuclear war will be immediately followed by the proletariat moving into action. The proletariat will embark upon social reorganisation. It will draw together what is left of the world populations and make a ruling class with it. In that process, its intervention will focus on the liquidation of every remnant, if any, of capitalism and bureaucracy.

The First World War produced the Soviet Workers State. In spite of Stalin's best efforts to stop the extension of the

Russian Revolution, the Second World War brought 8 more Workers States. There are now 14 Workers States and 16

Revolutionary States. The Third World War is the end of the capitalist system.

Mind that we do not seek the nuclear war. We do not reckon that such a war was the right way to get rid of the capitalist system, but this is how history has panned out. We

just speak as we find. As far as we are concerned, we prepare to face this situation by treasuring every useful means that history creates along the way, determined to do everything and draw all the conclusions necessary for the construction of Socialism.

It is not that we are without feelings! From the most profound of our Communist emotions, we lament the tragedy which is coming to millions and millions of human beings. We are not those who are guilty or responsible for it. Capitalism is! Feeling this too, the proletariat is all the more determined not to feel intimidated. The notion that the atomic war is going to crush so many millions of people fills us with appalling distress, but we do not feel responsible or guilty. Where we feel we have a responsibility, yes, is in proposing ways and means to help overcome the atomic 'charco' as fast as possible, and get Socialism under way.

At the start of, and during the atomic war, humanity will be penetrated by the collective sentiment of the proletariat – the very sentiment that helps the proletariat not to fear the atomic war and the consequences of capitalist barbarism. Observe how elevated the behaviour of humanity already is, in spite of finding itself without a class-and-mass revolutionary Party. It has mass parties, but they are not revolutionary. Humanity is going to behave in the way made necessary by its need to face up. If someone could prove to us that postponing the Socialist Revolution by 20, 30 or 50 years could avoid the nuclear war, we would go along with the idea. The matter however stems from a historic necessity, not a number of years. The atomic war is inevitable. And it will be followed, immediately, during and afterwards, by the world triumph of the Socialist Revolution.

Testimony about Betty and Barney Hill by Ben H. Swett

On 23 November 1962, I read some of my poetry to a meeting at the Rectory of the Unitarian Church in Portsmouth, New Hampshire. I wasn't a member of that church and didn't know anyone there except the pastor. After my poetry reading, he said he had heard I was studying hypnosis, and they would like to hear about that. Those who came for the poetry left, and a few remained. I gave them a brief overview of hypnosis, including some of its uses and abuses.

As I was about to leave, two people came up to me, introduced themselves as Betty and Barney Hill, and asked me if hypnosis could be used to recover lost periods of memory. I wondered why they asked that question, because I had just mentioned it in my talk, but I said, "Yes, that's one of the classical uses of clinical hypnosis."

They started telling me about something that happened to them as they were driving home from Canada on the night of 19-20 September 1961 -- a light in the sky that seemed to follow them and then circled them, and being stopped on the road, and how they later realized they had a three-hour gap in their memories. As they told their story, Barney's face kept twitching spasmodically on one side. I didn't like the looks of that.

They said some of their friends thought the light that followed them was a UFO, and asked me what I thought about UFOs. I said, "There are a lot of reports by credible people." Then they asked me if I would hypnotize them to recover that gap in their memories. My first thought was: "I don't want to wade into whatever is making his face twitch like that. I'm not a psychiatrist." Then I thought: "UFOs ... I'm an Air Force officer ... hypnosis ... I have no credentials." So I said, "No, I'm not qualified to do that." There was some discussion of UFOs. Three of the men obviously knew a lot about Air Force UFO reporting -- more than I did -- but I didn't know them.

Betty and Barney walked outside with me, and we talked for rather a long time. I was skeptical of their story, but responded as best I could. They said several people had suggested they try hypnosis, and since I had studied it and recommended it for recovering memories, they thought they would go ahead with it. I said recovering those memories might reveal a lot of trauma, and cautioned them against going to an amateur hypnotist, such as myself, or a half-baked hypnotherapist. I said they needed to find a reputable psychologist or psychiatrist who used hypnotherapy.

On 7 September 1963, I gave a lecture on hypnosis to one of the adult study groups at the Unitarian Church in Portsmouth, followed by a question-and-answer period. No one mentioned UFOs. Several years later I learned that Betty and Barney had told their story to this group before I arrived. They came to me afterward and said they had not tried hypnosis, and still had the gap in their memories. Betty was still having dreams about the incident, but she wasn't as upset about them. Barney was going to a psychiatrist he liked and trusted. He had mentioned the UFO incident, and the psychiatrist wasn't astonished, but they were not working on that. I thought, "This sounds right. He's in good hands." I strongly encouraged them to ask Barney's psychiatrist about the use of hypnosis to recover the gap in their memories.

I didn't hear anything about the Hills for the next nine months. It was only later that I learned they had acted on my recommendation, and Barney's psychiatrist had referred them to Dr. Benjamin Simon, a well-known psychiatrist in Boston. They first met with him on 14 December 1963. From 4 January to 27 June 1964, they drove to Boston one day a week. Dr. Simon always hypnotized them separately and made sure that neither of them could hear what the other one said. Under hypnosis, they were able to remember the UFO incident, but it was so traumatic for them that he reactivated the amnesia at the end of each session. Starting about the first of April, the sessions were mostly based on playback of the audio tapes made under hypnosis. At the end of the last session, Dr.

Simon gave them the tapes and said they should listen to them at home, because that might help to reduce the trauma.

On 27 June 1964, as soon as they got home, Barney telephoned me at supper-time. I was surprised to hear from him. He said they took my advice, had tape recordings made under hypnosis, and asked if they could bring the tapes to our house, because they didn't want to listen to them alone. They wanted me to listen to the tapes and tell them what I thought. So the four of us -- Betty and Barney and Wyn and I -- sat on the floor in our living room that night and listened to the recording of Barney's first session under hypnosis.

I was skeptical at first, but hearing what was on that tape, plus the fact they didn't want any publicity, convinced me they were telling the truth. For example: under hypnosis, Barney described seeing the UFO hovering close to the ground near the road. He got out of his car, walked toward it and looked at it through binoculars. Something like a man was looking at him out of a window -- right into his eyes -- and started putting thoughts in his mind: "He says 'Come a little closer ... Don't be scared' ... Uh ... I used to talk to rabbits like that ... when I was hunting them." Just before the point on the tape where Barney started screaming "I've gotta get outta here!" and ran back to his car, the physical Barney jumped up and ran out to our kitchen and vomited in the sink. I thought that would be pretty hard to fake.

When we finished listening to the tape, they asked me what I thought about it. I said I thought they were telling the truth. But that wasn't the problem. They said Dr. Simon also thought they deeply believed all this was true, but they wanted to know if it was real. Did this really happen to them, or was it somehow a dream or a fantasy created in their minds? I said I would need to hear all of the tapes before I would even try to answer that question. They left the tapes with me.

I listened to all the tapes. That took five nights. I made a lot of notes and went back to several tapes to make sure I had them right. Then I cross-checked comparable elements, distilled the whole thing in my mind, and decided what I believe. It was obvious that the Hills were deeply hypnotized. What they recalled under hypnosis consistently (and persistently) supported the hypothesis that their experience was real. But Dr. Simon didn't believe in UFOs and wasn't about to. He kept leading them toward any other explanation, and thus strongly suggested their experience wasn't real. That was why they were so ambivalent and why their trauma had not been resolved. On the positive side, the fact he did not believe them (did not suggest it to them and tried to lead them away from it), greatly increased their credibility and thus supported the hypothesis that what they remembered was real.

I telephoned the Hills, went to their house, returned their audio tapes, told them I was convinced their experience was real, and explained why I thought so.

I said it was obvious that they were deeply hypnotized; I knew that from my own work with hypnosis. They were hypnotized separately and not allowed to hear each other's sessions, so there was no information feedback or cross-feed. Most important, Dr. Simon strongly suggested to them (under hypnosis!) every other explanation he could think of, but they persisted in the same report.

Don't Forget Laika!: Relationship between Humans, Animals, and Ecological Ideas



The Part played by Labour in the Transition from Ape to Man by Frederick Engels (unfinished)

Labour is the source of all wealth, the political economists assert. And it really is the source – next to nature, which supplies it with the material that it converts into wealth. But it is even infinitely more than this. It is the prime basic condition for all human existence, and this to such an extent that, in a sense, we have to say that labour created man himself.

Many hundreds of thousands of years ago, during an epoch, not yet definitely determinable, of that period of the earth's history known to geologists as the Tertiary period, most likely towards the end of it, a particularly highly-developed race of

anthropoid apes lived somewhere in the tropical zone – probably on a great continent that has now sunk to the bottom of the Indian Ocean. Darwin has given us an approximate description of these ancestors of ours. They were completely covered with hair, they had beards and pointed ears, and they lived in bands in the trees.

First, owing to their way of living which meant that the hands had different functions than the feet when climbing, these apes began to lose the habit of using their hands to walk and adopted a more and more erect posture. This was the decisive step in the transition from ape to man.

All extant anthropoid apes can stand erect and move about on their feet alone, but only in case of urgent need and in a very clumsy way. Their natural gait is in a half-erect posture and includes the use of the hands. The majority rest the knuckles of the fist on the ground and, with legs drawn up, swing the body through their long arms, much as a cripple moves on crutches. In general, all the transition stages from walking on all fours to walking on two legs are still to be observed among the apes today. The latter gait, however, has never become more than a makeshift for any of them.

It stands to reason that if erect gait among our hairy ancestors became first the rule and then, in time, a necessity, other diverse functions must, in the meantime, have devolved upon the hands. Already among the apes there is some difference in the way the hands and the feet are employed. In climbing, as mentioned above, the hands and feet have different uses. The hands are used mainly for gathering and holding food in the same way as the fore paws of the lower mammals are used. Many apes use their hands to build themselves nests in the trees or even to construct roofs between the branches to protect

themselves against the weather, as the chimpanzee, for example, does. With their hands they grasp sticks to defend themselves against enemies, or bombard their enemies with fruits and stones. In captivity they use their hands for a number of simple operations copied from human beings. It is in this that one sees the great gulf between the undeveloped hand of even the most man-like apes and the human hand that has been highly perfected by hundreds of thousands of years of labour. The number and general arrangement of the bones and muscles are the same in both hands, but the hand of the lowest savage can perform hundreds of operations that no simian hand can imitate – no simian hand has ever fashioned even the crudest stone knife.

The first operations for which our ancestors gradually learned to adapt their hands during the many thousands of years of transition from ape to man could have been only very simple ones. The lowest savages, even those in whom regression to a more animal-like condition with a simultaneous physical degeneration can be assumed, are nevertheless far superior to these transitional beings. Before the first flint could be fashioned into a knife by human hands, a period of time probably elapsed in comparison with which the historical period known to us appears insignificant. But the decisive step had been taken, the hand had become free and could henceforth attain ever greater dexterity; the greater flexibility thus acquired was inherited and increased from generation to generation.

Thus the hand is not only the organ of labour, it is also the product of labour. Only by labour, by adaptation to ever new operations, through the inheritance of muscles, ligaments, and, over longer periods of time, bones that had undergone special development and the ever-renewed employment of this inherited finesse in new, more

and more complicated operations, have given the human hand the high degree of perfection required to conjure into being the pictures of a Raphael, the statues of a Thorwaldsen, the music of a Paganini.

But the hand did not exist alone, it was only one member of an integral, highly complex organism. And what benefited the hand, benefited also the whole body it served; and this in two ways.

In the first place, the body benefited from the law of correlation of growth, as Darwin called it. This law states that the specialised forms of separate parts of an organic being are always bound up with certain forms of other parts that apparently have no connection with them. Thus all animals that have red blood cells without cell nuclei, and in which the head is attached to the first vertebra by means of a double articulation (condyles), also without exception possess lacteal glands for suckling their young. Similarly, cloven hoofs in mammals are regularly associated with the possession of a multiple stomach for rumination. Changes in certain forms involve changes in the form of other parts of the body, although we cannot explain the connection. Perfectly white cats with blue eyes are always, or almost always, deaf. The gradually increasing perfection of the human hand, and the commensurate adaptation of the feet for erect gait, have undoubtedly, by virtue of such correlation, reacted on other parts of the organism. However, this action has not as yet been sufficiently investigated for us to be able to do more here than to state the fact in general terms.

Much more important is the direct, demonstrable influence of the development of the hand on the rest of the organism. It has already been noted that our simian ancestors

were gregarious; it is obviously impossible to seek the derivation of man, the most social of all animals, from non-gregarious immediate ancestors. Mastery over nature began with the development of the hand, with labour, and widened man's horizon at every new advance. He was continually discovering new, hitherto unknown properties in natural objects. On the other hand, the development of labour necessarily helped to bring the members of society closer together by increasing cases of mutual support and joint activity, and by making clear the advantage of this joint activity to each individual. In short, men in the making arrived at the point where they had something to say to each other. Necessity created the organ; the undeveloped larynx of the ape was slowly but surely transformed by modulation to produce constantly more developed modulation, and the organs of the mouth gradually learned to pronounce one articulate sound after another.

Comparison with animals proves that this explanation of the origin of language from and in the process of labour is the only correct one. The little that even the most highly-developed animals need to communicate to each other does not require articulate speech. In its natural state, no animal feels handicapped by its inability to speak or to understand human speech. It is quite different when it has been tamed by man. The dog and the horse, by association with man, have developed such a good ear for articulate speech that they easily learn to understand any language within their range of concept. Moreover they have acquired the capacity for feelings such as affection for man, gratitude, etc., which were previously foreign to them. Anyone who has had much to do with such animals will hardly be able to escape the conviction that in many cases they now feel their inability to speak as a defect, although, unfortunately, it is one that can no longer be remedied because their vocal organs are too specialised in a definite direction. However, where vocal organs exist, within certain limits even this inability disappears.

The buccal organs of birds are as different from those of man as they can be, yet birds are the only animals that can learn to speak; and it is the bird with the most hideous voice, the parrot, that speaks best of all. Let no one object that the parrot does not understand what it says. It is true that for the sheer pleasure of talking and associating with human beings, the parrot will chatter for hours at a stretch, continually repeating its whole vocabulary. But within the limits of its range of concepts it can also learn to understand what it is saying. Teach a parrot swear words in such a way that it gets an idea of their meaning (one of the great amusements of sailors returning from the tropics); tease it and you will soon discover that it knows how to use its swear words just as correctly as a Berlin costermonger. The same is true of begging for titbits.

First labour, after it and then with it speech – these were the two most essential stimuli under the influence of which the brain of the ape gradually changed into that of man, which, for all its similarity is far larger and more perfect. Hand in hand with the development of the brain went the development of its most immediate instruments – the senses. Just as the gradual development of speech is inevitably accompanied by a corresponding refinement of the organ of hearing, so the development of the brain as a whole is accompanied by a refinement of all the senses. The eagle sees much farther than man, but the human eye discerns considerably more in things than does the eye of the eagle. The dog has a far keener sense of smell than man, but it does not distinguish a hundredth part of the odours that for man are definite signs denoting different things. And the sense of touch, which the ape hardly possesses in its crudest initial form, has been developed only side by side with the development of the human hand itself, through the medium of labour.

The reaction on labour and speech of the development of the brain and its attendant senses, of the increasing clarity of consciousness, power of abstraction and of conclusion, gave both labour and speech an ever-renewed impulse to further development. This development did not reach its conclusion when man finally became distinct from the ape, but on the whole made further powerful progress, its degree and direction varying among different peoples and at different times, and here and there even being interrupted by local or temporary regression. This further development has been strongly urged forward, on the one hand, and guided along more definite directions, on the other, by a new element which came into play with the appearance of fully-fledged man, namely, society.

Hundreds of thousands of years – of no greater significance in the history of the earth than one second in the life of man [Engels note: A leading authority in this respect, Sir William Thomson, has calculated that little more than a hundred million years could have elapsed since the time when the earth had cooled sufficiently for plants and animals to be able to live on it.] – certainly elapsed before human society arose out of a troupe of tree-climbing monkeys. Yet it did finally appear. And what do we find once more as the characteristic difference between the troupe of monkeys and human society? Labour. The ape herd was satisfied to browse over the feeding area determined for it by geographical conditions or the resistance of neighbouring herds; it undertook migrations and struggles to win new feeding grounds, but it was incapable of extracting from them more than they offered in their natural state, except that it unconsciously fertilised the soil with its own excrement. As soon as all possible feeding grounds were occupied, there could be no further increase in the ape population; the number of animals could at best remain stationary. But all animals waste a great deal of food, and, in addition, destroy in the germ the next generation of the food supply. Unlike the hunter, the wolf

does not spare the doe which would provide it with the young the next year; the goats in Greece, that eat away the young bushes before they grow to maturity, have eaten bare all the mountains of the country. This “predatory economy” of animals plays an important part in the gradual transformation of species by forcing them to adapt themselves to other than the usual food, thanks to which their blood acquires a different chemical composition and the whole physical constitution gradually alters, while species that have remained unadapted die out. There is no doubt that this predatory economy contributed powerfully to the transition of our ancestors from ape to man. In a race of apes that far surpassed all others in intelligence and adaptability, this predatory economy must have led to a continual increase in the number of plants used for food and the consumption of more and more edible parts of food plants. In short, food became more and more varied, as did also the substances entering the body with it, substances that were the chemical premises for the transition to man.

But all that was not yet labour in the proper sense of the word. Labour begins with the making of tools. And what are the most ancient tools that we find – the most ancient judging by the heirlooms of prehistoric man that have been discovered, and by the mode of life of the earliest historical peoples and of the rawest of contemporary savages? They are hunting and fishing implements, the former at the same time serving as weapons. But hunting and fishing presuppose the transition from an exclusively vegetable diet to the concomitant use of meat, and this is another important step in the process of transition from ape to man. A meat diet contained in an almost ready state the most essential ingredients required by the organism for its metabolism. By shortening the time required for digestion, it also shortened the other vegetative bodily processes that correspond to those of plant life, and thus gained further time, material and desire for the active manifestation of animal life proper. And the farther man in the making moved from the

vegetable kingdom the higher he rose above the animal. Just as becoming accustomed to a vegetable diet side by side with meat converted wild cats and dogs into the servants of man, so also adaptation to a meat diet, side by side with a vegetable diet, greatly contributed towards giving bodily strength and independence to man in the making. The meat diet, however, had its greatest effect on the brain, which now received a far richer flow of the materials necessary for its nourishment and development, and which, therefore, could develop more rapidly and perfectly from generation to generation. With all due respect to the vegetarians man did not come into existence without a meat diet, and if the latter, among all peoples known to us, has led to cannibalism at some time or other (the forefathers of the Berliners, the Weletabians or Wilzians, used to eat their parents as late as the tenth century), that is of no consequence to us today.

The meat diet led to two new advances of decisive importance – the harnessing of fire and the domestication of animals. The first still further shortened the digestive process, as it provided the mouth with food already, as it were, half-digested; the second made meat more copious by opening up a new, more regular source of supply in addition to hunting, and moreover provided, in milk and its products, a new article of food at least as valuable as meat in its composition. Thus both these advances were, in themselves, new means for the emancipation of man. It would lead us too far afield to dwell here in detail on their indirect effects notwithstanding the great importance they have had for the development of man and society.

Just as man learned to consume everything edible, he also learned to live in any climate. He spread over the whole of the habitable world, being the only animal fully able to do so of its own accord. The other animals that have become accustomed to all climates –

domestic animals and vermin – did not become so independently, but only in the wake of man. And the transition from the uniformly hot climate of the original home of man to colder regions, where the year was divided into summer and winter, created new requirements – shelter and clothing as protection against cold and damp, and hence new spheres of labour, new forms of activity, which further and further separated man from the animal.

By the combined functioning of hand, speech organs and brain, not only in each individual but also in society, men became capable of executing more and more complicated operations, and were able to set themselves, and achieve, higher and higher aims. The work of each generation itself became different, more perfect and more diversified. Agriculture was added to hunting and cattle raising; then came spinning, weaving, metalworking, pottery and navigation. Along with trade and industry, art and science finally appeared. Tribes developed into nations and states. Law and politics arose, and with them that fantastic reflection of human things in the human mind – religion. In the face of all these images, which appeared in the first place to be products of the mind and seemed to dominate human societies, the more modest productions of the working hand retreated into the background, the more so since the mind that planned the labour was able, at a very early stage in the development of society (for example, already in the primitive family), to have the labour that had been planned carried out by other hands than its own. All merit for the swift advance of civilisation was ascribed to the mind, to the development and activity of the brain. Men became accustomed to explain their actions as arising out of thought instead of their needs (which in any case are reflected and perceived in the mind); and so in the course of time there emerged that idealistic world outlook which, especially since the fall of the world of antiquity, has dominated men's minds. It still rules them to such a degree that even the most

materialistic natural scientists of the Darwinian school are still unable to form any clear idea of the origin of man, because under this ideological influence they do not recognise the part that has been played therein by labour.

Animals, as has already been pointed out, change the environment by their activities in the same way, even if not to the same extent, as man does, and these changes, as we have seen, in turn react upon and change those who made them. In nature nothing takes place in isolation. Everything affects and is affected by every other thing, and it is mostly because this manifold motion and interaction is forgotten that our natural scientists are prevented from gaining a clear insight into the simplest things. We have seen how goats have prevented the regeneration of forests in Greece; on the island of St. Helena, goats and pigs brought by the first arrivals have succeeded in exterminating its old vegetation almost completely, and so have prepared the ground for the spreading of plants brought by later sailors and colonists. But animals exert a lasting effect on their environment unintentionally and, as far as the animals themselves are concerned, accidentally. The further removed men are from animals, however, the more their effect on nature assumes the character of premeditated, planned action directed towards definite preconceived ends. The animal destroys the vegetation of a locality without realising what it is doing. Man destroys it in order to sow field crops on the soil thus released, or to plant trees or vines which he knows will yield many times the amount planted. He transfers useful plants and domestic animals from one country to another and thus changes the flora and fauna of whole continents. More than this. Through artificial breeding both plants and animals are so changed by the hand of man that they become unrecognisable. The wild plants from which our grain varieties originated are still being sought in vain. There is still some dispute about the wild animals from which

our very different breeds of dogs or our equally numerous breeds of horses are descended.

It goes without saying that it would not occur to us to dispute the ability of animals to act in a planned, premeditated fashion. On the contrary, a planned mode of action exists in embryo wherever protoplasm, living albumen, exists and reacts, that is, carries out definite, even if extremely simple, movements as a result of definite external stimuli. Such reaction takes place even where there is yet no cell at all, far less a nerve cell. There is something of the planned action in the way insect-eating plants capture their prey, although they do it quite unconsciously. In animals the capacity for conscious, planned action is proportional to the development of the nervous system, and among mammals it attains a fairly high level. While fox-hunting in England one can daily observe how unerringly the fox makes use of its excellent knowledge of the locality in order to elude its pursuers, and how well it knows and turns to account all favourable features of the ground that cause the scent to be lost. Among our domestic animals, more highly developed thanks to association with man, one can constantly observe acts of cunning on exactly the same level as those of children. For, just as the development history of the human embryo in the mother's womb is only an abbreviated repetition of the history, extending over millions of years, of the bodily development of our animal ancestors, starting from the worm, so the mental development of the human child is only a still more abbreviated repetition of the intellectual development of these same ancestors, at least of the later ones. But all the planned action of all animals has never succeeded in impressing the stamp of their will upon the earth. That was left for man.

In short, the animal merely uses its environment, and brings about changes in it simply by its presence; man by his changes makes it serve his ends, masters it. This is the final, essential distinction between man and other animals, and once again it is labour that brings about this distinction.

Let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first. The people who, in Mesopotamia, Greece, Asia Minor and elsewhere, destroyed the forests to obtain cultivable land, never dreamed that by removing along with the forests the collecting centres and reservoirs of moisture they were laying the basis for the present forlorn state of those countries. When the Italians of the Alps used up the pine forests on the southern slopes, so carefully cherished on the northern slopes, they had no inkling that by doing so they were cutting at the roots of the dairy industry in their region; they had still less inkling that they were thereby depriving their mountain springs of water for the greater part of the year, and making it possible for them to pour still more furious torrents on the plains during the rainy seasons. Those who spread the potato in Europe were not aware that with these farinaceous tubers they were at the same time spreading scrofula. Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature – but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly.

And, in fact, with every day that passes we are acquiring a better understanding of these laws and getting to perceive both the more immediate and the more remote consequences of our interference with the traditional course of nature. In particular, after the mighty advances made by the natural sciences in the present century, we are more than ever in a position to realise, and hence to control, also the more remote natural consequences of at least our day-to-day production activities. But the more this progresses the more will men not only feel but also know their oneness with nature, and the more impossible will become the senseless and unnatural idea of a contrast between mind and matter, man and nature, soul and body, such as arose after the decline of classical antiquity in Europe and obtained its highest elaboration in Christianity.

It required the labour of thousands of years for us to learn a little of how to calculate the more remote natural effects of our actions in the field of production, but it has been still more difficult in regard to the more remote social effects of these actions. We mentioned the potato and the resulting spread of scrofula. But what is scrofula compared to the effects which the reduction of the workers to a potato diet had on the living conditions of the popular masses in whole countries, or compared to the famine the potato blight brought to Ireland in 1847, which consigned to the grave a million Irishmen, nourished solely or almost exclusively on potatoes, and forced the emigration overseas of two million more? When the Arabs learned to distil spirits, it never entered their heads that by so doing they were creating one of the chief weapons for the annihilation of the aborigines of the then still undiscovered American continent. And when afterwards Columbus discovered this America, he did not know that by doing so he was giving a new lease of life to slavery, which in Europe had long ago been done away with, and laying the basis for the Negro slave trade. The men who in the seventeenth and eighteenth centuries laboured to create the steam-engine had no idea that they were

preparing the instrument which more than any other was to revolutionise social relations throughout the world. Especially in Europe, by concentrating wealth in the hands of a minority and dispossessing the huge majority, this instrument was destined at first to give social and political domination to the bourgeoisie, but later, to give rise to a class struggle between bourgeoisie and proletariat which can end only in the overthrow of the bourgeoisie and the abolition of all class antagonisms. But in this sphere too, by long and often cruel experience and by collecting and analysing historical material, we are gradually learning to get a clear view of the indirect, more remote social effects of our production activity, and so are afforded an opportunity to control and regulate these effects as well.

This regulation, however, requires something more than mere knowledge. It requires a complete revolution in our hitherto existing mode of production, and simultaneously a revolution in our whole contemporary social order.

All hitherto existing modes of production have aimed merely at achieving the most immediately and directly useful effect of labour. The further consequences, which appear only later and become effective through gradual repetition and accumulation, were totally neglected. The original common ownership of land corresponded, on the one hand, to a level of development of human beings in which their horizon was restricted in general to what lay immediately available, and presupposed, on the other hand, a certain superfluity of land that would allow some latitude for correcting the possible bad results of this primeval type of economy. When this surplus land was exhausted, common ownership also declined. All higher forms of production, however, led to the division of the population into different classes and thereby to the antagonism

of ruling and oppressed classes. Thus the interests of the ruling class became the driving factor of production, since production was no longer restricted to providing the barest means of subsistence for the oppressed people. This has been put into effect most completely in the capitalist mode of production prevailing today in Western Europe. The individual capitalists, who dominate production and exchange, are able to concern themselves only with the most immediate useful effect of their actions. Indeed, even this useful effect – inasmuch as it is a question of the usefulness of the article that is produced or exchanged – retreats far into the background, and the sole incentive becomes the profit to be made on selling.

Classical political economy, the social science of the bourgeoisie, in the main examines only social effects of human actions in the fields of production and exchange that are actually intended. This fully corresponds to the social organisation of which it is the theoretical expression. As individual capitalists are engaged in production and exchange for the sake of the immediate profit, only the nearest, most immediate results must first be taken into account. As long as the individual manufacturer or merchant sells a manufactured or purchased commodity with the usual coveted profit, he is satisfied and does not concern himself with what afterwards becomes of the commodity and its purchasers. The same thing applies to the natural effects of the same actions. What cared the Spanish planters in Cuba, who burned down forests on the slopes of the mountains and obtained from the ashes sufficient fertiliser for one generation of very highly profitable coffee trees – what cared they that the heavy tropical rainfall afterwards washed away the unprotected upper stratum of the soil, leaving behind only bare rock! In relation to nature, as to society, the present mode of production is predominantly concerned only about the immediate, the most tangible result; and then surprise is expressed that the more remote effects of actions directed to this end turn out to be quite

different, are mostly quite the opposite in character; that the harmony of supply and demand is transformed into the very reverse opposite, as shown by the course of each ten years' industrial cycle – even Germany has had a little preliminary experience of it in the “crash”; that private ownership based on one's own labour must of necessity develop into the expropriation of the workers, while all wealth becomes more and more concentrated in the hands of non-workers;

The Relationship with the Animals and Socialism by J. Posadas

Our visit to the zoological gardens was not intended to review the specimens of life that are generally classed as ‘inferior’.

We did not go either to reassure ourselves that, us humans, are above the backwardness of the ‘inferiors’.

We went to educate ourselves for the task that consists in helping to harmonise the human being, the animal, and life, as part of nature and the cosmos. Humanity already strives towards this aim.

Apart from some texts by Marx and Engels, few Marxist writings deal with the relationship between humanity and the animals. We say ‘humanity’ here, but it is not exact. In this context, ‘humanity’ is the ruling class. The ruling class drills its own concepts into humanity. In our behaviour towards the animals, what you see is the power relations of the humans towards each other.

Marx and Engels were the first to investigate those concerns. Engels’ book on *The Origins of the family, private property and the State* (1884) remains the most complete study on the function of class. It is short but complete.

The power relations you observe in our treatment of the animals are those already existing in capitalist society. The way the animals are treated typifies the capitalist norms of power. These norms have little concern for the animal, particularly when the animal can no longer be exploited.

We do not have the time to study this in greater depth, but we know that in Socialism, humanity will appreciate the animals for what they are. It may be that humanity will continue to use animals for a while, but people will want to find alternatives.

In Socialism, humanity will want to organise and support life in every way. It will defend every form of life, because every form of life is a link with the cosmos. Isn't our natural environment bathing in the cosmos?

In Socialism, relations will no longer need power. We will no longer need to get something back from our relationship with the animals. Our relationship with the animals will be based on the appreciation of our common origins. The animal stayed at a given stage of development and we developed further. So what?

Like us, the animals come from the empirical stages in the development of nature – nature, not of the cosmos. It is important to study this. Our love for the animals is a source of harmony in our lives. It may be that we will have to carry on killing animals for some time; in due course, humanity will be making an experience of life so rich that even wild animals will stop being wild.

In Socialism, humanity will win the animals, incorporating them. More animals will become tame. Others will become extinct in a way comparable to today. The rhinos and giraffes are not likely to come back, but new species will emerge. Extinction is but one aspect of the many combinations in the organisation of life on Earth. Life on Earth was organised in thousands of ways, through thousands of reasons, all determined by the surrounding cosmos and by nature on Earth.

Harmony wants brute force replaced by knowledge and intelligence: It is questionable whether the fly has a great future, but the elephant is an intelligent creature and it gets along with people. The affinity between the elephant and the human being is a sign of common roots. The human being yearns after harmony with nature.

Harmony with nature needs knowledge and intelligence to replace brute force. Brute force is what we have today. The animals should not be in zoos. By making them captive, we feel a sense of superiority over them. Is it to gloat, or to justify ourselves,

that we deem the animal to be ‘wild’, and not ourselves? Capitalism shows penned animals under a banner that says: “We are superior to the animals”. And not far behind, another banner says: “Beware of the company of beasts that do not respect the law”. The law being the ruling law, the capitalist law, the law of property. Humanity has developed a keen interest in all matters to do with its common origins and relationship with the animals. Darwin laid the ground, and some knowledge was acquired since. In society at large, the origins of the animals are not often considered. The scientists who look into the cellular basis of life are not expected to link their studies with the ways life became organised. Capitalism cannot do this objectively and dialectically. It would indict itself if it did. The capitalists do not look for evidence where their power might be questioned.

Behind their constant insinuation that “the human being is more powerful than the animal”, this is what they mean. Their narratives on the Palaeolithic and Neolithic periods leave huge blanks. They show human progress without the principles behind its evolution; they do not deal with the evolution of the historic stages; and they keep changing their estimates about the duration of past ages. The value of what they say is very relative. It will be entirely down to us, in the end, to explain, demonstrate and organise everything for the elimination of all the forms oppression, imposition and exploitation.

The human being of today emerged from the empirical development of previous hominids. There is intelligence also in the animals. The lion and the elephant are intelligent. The bear also, and so is the monkey. Some of these are domesticated. We will analyse this further, at a later date, because we cannot do it now. We will do it as part of the study of human society - not of palaeontology - and on the basis of science.

Capitalism is the bane of human knowledge: We recognise the role of Darwin, but we condemn private property for having left these matters fall to neglect and empiricism.

We denounce the capitalist class for not wanting to look beyond the protection of its power to exploit, to make war, to develop atomic weapons and to threaten planet Earth. Capitalism stands in the way of the intelligent and thorough investigation of the cosmos. We condemn capitalism for each of those things.

Had Plato, Socrates, Aristotle, Demosthenes and Democritus been able to change society, now we would be in an entirely different historic era. It did not happen because private property blocked the way. Private property has been the bane of human knowledge. In spite of all this however, we feel a deep sense of harmony for being part of the continuing struggle for human progress. We have made it our task to help root out all the hurdles in the way of progress.

The Workers States are not responsible for their own shortcomings. The limitations of the Workers States come from private property, that is to say, from the way they were organised before they became Workers States. The struggle goes on in the Workers States: They must overcome bureaucracy, and confront capitalism now on its last legs. The responsibility for every failure in the Workers States is to be laid at the door of private property.

Private property separated the human beings from nature. It kept them continually at each other's throat. And it broke the harmony of Greek development. The Greeks grasped some of this and sought to have it reversed. Lucretius wrote about it. Of course no human development can happen without a corresponding system of production. We know this, but it does not stop us making an assessment of private property. This is how history has been.

The Greeks could not know all this, but we do. It is hard for the people of today to bear the disharmony between nature, our human past and our human aims. People turn to the

animals in want for harmony, less in search of common ancestries than to integrate all the fruit of nature in the human quest for progress.

We already communicate a lot with animals. Not so much with the fish, but a little more with the shark and a lot with the dolphin. We cannot do more because the elements and the structures standing in the way still need removing. When the intelligence of communist society is established, it will beam outwards in all directions, and towards all the animals.

The capitalist class mocks the thought of human harmony: The humans have developed an intelligence superior to that of the animals, certainly. They developed qualities, means and forms that the animals did not. This is so, but human intelligence is a product of social life, and no single human being could have done it. Our intelligence is not the point however. The point is to develop objective love and harmonious relations with all that exists.

It is not easy to feel love for reptiles, but there are reptiles that can obey you. This means that there is a common origin in the brain formation, which diversified afterwards under particular genetic and organic conditions. Humanity longs for the harmony that unites all the forms of life, as part of the organisation of nature in the interests of all.

Less and less importance is given today to the animals because these play diminishing roles in production. It is not that capitalism has learnt to respect them, but that their labour is no longer economic. The capitalist class discards the animals because it no longer needs them. As a class, it cannot develop any sense of harmony with them any more than it does for all the rest of life, nature, the cosmos, or even itself! Such is private property.

The development of the large capitalist countries took place through the use of slavery. The ruling classes of Portugal, France, North America, Britain and Germany all took

part. Harmony between the human beings and nature was not going to be for them! They only allowed for the 'harmony' required by capital accumulation, and from then on, their only concern would be appropriation, competition and war. These people laugh at the thought of human harmony. Private property in the means of production meant private property dominating science and the technology of production. This basically truncated the development of science; it stopped the development of entire countries, starting with the colonised peoples, Black people, Mixed Race and the Indigenous populations, and many more.

Capitalism does not want to investigate these matters. Even after Darwin, anthropological and zoological science stayed very limited. One of the best anthropologies is that of Lewis H Morgan who gave the principles for a history of the human relations. After him, there remained to study the principles that link the human being, the animals, nature and the universe. It was not, and it is not in the interests of capitalism to do that. It is the Soviet Union that started along those lines. The task is to eliminate every form of egotism: In the history of the organisation of intelligence after the Greeks, the salient period is that of the Renaissance. Private property that curtailed the Greeks, curtailed the Renaissance too. It is true that the Renaissance was able to go farther than the Greeks in some major ways; but from our position of hindsight today - 2,000 years after the Greeks - we verify that private property has been the bane of the progress of history.

Per force this led to science being partial: Science aimed at stopping the necessary organisation of humanity. Science used to stop the objective capacity of humanity to think as a humankind. This was motivated, and still is, by the compulsion of the ruling class to keep everything for itself - the use of nature included, the use of the animals, the use of the human beings.

With this visit to the zoo, we sought to be preoccupied with the question of where humanity comes from; and this, in order to know better where humanity is going. The obstacle in the way of knowing better is private property. For humanity to know where it comes from and where it goes to, it must end private property.

People are increasingly interested in this subject. There is a general acceptance that humanity is going to the cosmos. People see well beyond the Earth already. They see the Earth as part of the cosmos. Our concern for the animals does not try to make an empirical defence of the animals, but a harmonious appraisal of what conduct to have, as human beings, towards them and everything that exists. We seek harmony with the animals, hence with nature, as a means to contact the origins and birth of life. We seek this harmony because it poses the elimination of all egotism, appropriation, imposition and arrogance.

With the end of capitalism, it is not just private property that comes down, but all the forms of utilisation of nature and life for individual and class gains. We deem our preoccupation to be eminently just and fair. The Greeks were interested in all this. They could not develop this thought to the full, but they had this concern.

What we know today about the universe is very insufficient. The foresight, the intuition and the desire to understand the movement of the world are expressions of humanity's deeper grasp that it is part of the movement of the universe. In itself, this gives a great sense of unity. Not unity on Earth with the ruling class. No, the unity of the cosmos. The preoccupation for such things is growing. Soon it will captivate humanity.

On Beaver Canals

From: *The American beaver and his works* by Lewis H. Morgan

In the excavation of artificial canals as a means for transporting their wood by water to their lodges, we discover, as it seems to me, the highest act of intelligence and knowledge performed by beavers. Remarkable as the dam may well be considered, from its structure and objects, it scarcely surpasses, if it may be said to equal, these waterways, here called canals, which are excavated through the lowlands bordering their ponds for the purpose of reaching the hard wood, and of affording a channel for its transportation to their lodges. To conceive and execute such a design presupposes a more complicated and extended process of reasoning than that required for the construction of a dam; and, although a much simpler work to perform, when the thought was fully developed, it was far less to have been expected from a mute animal.

When I first came upon these canals, and found they were christened with this name both by Indians and trappers, I doubted their artificial character, and supposed them referable to springs as their producing cause; but their form, location, and evident object showed conclusively that they were beaver excavations. They are not mentioned, as far as I am aware, in any of the current accounts of this animal, for which reason, as well as their extraordinary character, they are deserving of more than a general notice. From the preceding engravings an impression has been obtained of the character of the forest in the vicinity of dams and ponds. It will be observed that the tamarack and spruce are the prevailing trees upon the borders of the streams. These evergreen trees are themselves indicative of swamp lands. Both the Esconauba and the Carp flow through low grounds, which, widening out in places into flats, are invariably covered with these trees; with the exception of the areas of the beaver meadows. Birch, maple, poplar, and ash are found upon the first high ground; but often at the distance of several hundred feet from the

original channel of the stream. In some places these rivers cut the high banks, thus bringing the deciduous trees within reach; but the latter are some distance back at the greater proportion of the ponds shown on the map. It is one of the principal objects of dams on the small streams, which are without defined banks, to flood the low grounds with a pond, and thus obtain a water connection with the first high ground upon which the hard wood is found. Where the pond fails to accomplish this fully, and also where the banks are defined and mark the limits of the pond, the deficiency is supplied by the canals in question. On descending surfaces, as has elsewhere been stated, beavers roll and drag their short cuttings down into the ponds. But where the ground is low, it is generally so uneven or rough as to render it extremely difficult, if not impossible, for the beavers to move them, for any considerable distance, by physical force. Hence the canal for floating them across the intervening level ground to the pond. The necessity for it is so apparent as to diminish our astonishment at its construction; and yet that the beaver should devise a canal to surmount this difficulty is not the less remarkable. The area represented by the map is not more abundantly supplied with dams, lodges, and burrows than with artificial canals. It contains within its limits nearly every variety of the works of the beaver found in North America, some of which, as the Grass Lake dam, are unequaled in their magnitude and completeness. Beaver canals are very numerous within this area. Many of them are small and unimportant; but the great length of some of them is the striking feature which invests them, as artificial works, with a high degree of interest.

Immediately north of the Cleveland Iron Mine there is a natural pond (Plate XVII.) covering about forty acres of land. It is bordered on all sides, except at its outlet, with rising ground at the distance of a few hundred feet from its margin. The intermediate ground is level, and rises but a few inches above the surface of the pond. On this low

land there is first a border of moss turf entirely skirting the pond, and spreading out in different places from fifty to two hundred or more feet. Without this, tamarack, spruce, and pine are found; and upon the rising ground, birch, ash, and maple. The pond is shallow, and thickly sprinkled over in the summer with water lilies; while in the moss turf, the unique Pitcher-plant [*Sarracenia Purpurea*) grows in the greatest profusion. This turf, which is saturated with water, and yields under the feet, spreads out like a carpet on the skirts of the pond. These particulars have been mentioned to show that there was not a spot of solid earth impinging upon the water in which the beavers could construct a burrow. It is well known that they never risk their personal safety upon the lodge alone, which is conspicuous to their enemies, but rely upon concealed burrows as the places of final resort. In addition to the principal use of a canal to reach by water the hard-wood lands, it was also necessary to their inhabiting this pond that they should be able, by its means, to reach burrowing ground.

These canals are about three feet wide and about three feet deep, with a depth of water varying from fifteen to thirty inches. They are made by excavation. The earth, which is more or less soft from saturation, is removed by being thrown out on either side, or carried out into the pond. In some places it appears to have been placed on the bank, but nearly all of these canals are so old that no signs can now be observed of the places where the excavated materials were deposited. Their artificial character is demonstrated by other proofs. In the first place, they are filled with water from the ponds up to the first of the dams, which are sometimes built across them; and where there are none, then to the end of the excavation. The banks, in the second place, are vertical, showing none of the marks of water flowing in a small stream. In the third place, they often terminate in dry hard earth at the foot of the rising ground. There is not, in the fourth place, the slightest current in these canals showing that they are fed by springs. In the fifth place, surface water, filtering through grounds substantially level, never could cut such

uniform, and, much less, such deep cuttings. And in the sixth and last place, roots of trees, four inches in diameter, are found cut off and removed to afford an unobstructed channel. In like manner, alder bushes, which branch low, as well as send out strong roots, are found cut off in large numbers where they overhang and line their borders. An inspection and comparison of a number of these canals leave no doubt whatever of their artificial character. The first canal to be described, and which is shown in Plate XVIII., is on the north side of the pond represented in the preceding plate. For the distance of four hundred and fifty feet it is cut through level ground, and filled with water from the pond. There are knolls or hummocks scattered over the surface in which tamarack and spruce trees are rooted; but there is no perceptible ascent until the first dam is reached, when there is a rise of about a foot. The banks of the canal, which are vertical, rise a few inches above the level of the water with which it is filled. Up to this dam it is perfectly evident that the water in the canal is supplied from the pond. Twenty-five feet above there is a second rise of about a foot, and here we find a second dam, extending over seventy-five feet beyond the canal on one side, and twenty-seven on the other. As here used, these dams are exceedingly ingenious. They were designed to receive and hold the surface water from rains, as well as that passed down by drainage from the high grounds, after which it was collected by filtration, in the channel of the canal which is sunk about three feet below the level of the surrounding ground. At the distance of forty-seven feet from the second, there is a third and much larger dam, one hundred and forty-two feet long, constructed in a semicircle, with its arms pointing out toward the high ground, and designed for the same object. It collects the surface water in pools, here and there, but fails to form a pond for want of sufficient water. With this dam the canal terminates. At this point the hard wood is reached, at the distance of five hundred and twenty-three feet from the pond. A B in the diagram represent a transverse section of the first dam, on the line of the canal; and C D, the same of the third. The crests of these

dams where they cross the canal are depressed, or worn down, in the centre, by the constant passage of beavers over them while going to and fro, and dragging their cuttings. This canal, with its adjuncts of dams and its manifest objects, is a remarkable work, transcending very much the ordinary estimates of the intelligence of the beaver. It served to bring the occupants of the pond into easy connection, by water, with the trees that supplied them with food, as well as to relieve them from the tedious, and perhaps impossible, task of moving their cuttings five hundred feet over uneven ground, unassisted by any descent. As an effort of free intelligence to surmount natural obstacles, it is one of the highest achievements of this animal. The width and depth of the channel at different points are sufficiently shown upon the ground plan

Not the least interesting fact connected with this canal is that of the great amount of labor necessary for its excavation. It must have required many years of continuous effort before it was brought into its present completed condition, both as to length and depth. The canals are most likely cleaned out and deepened from time to time, as materials from the surface fall into them and obstruct the channel. The bottom was covered with fine fibres and tendrils of tree roots, and with decayed leaves, which made it soft and yielding to the depth of a foot below the apparent bottom.

There are several canals connected with this pond, of which the four largest commence near the four lodges situated upon its borders. It will be sufficient to describe one of those remaining, taking that immediately opposite on the south side of the pond (Plate XIX.). This canal is also excavated through the low ground, and is filled to its extreme ends with water from the pond. At the distance of one hundred and fifty feet it reaches the first rise of ground, and the hard-wood land, where it branches into two canals, one of which is continued for one hundred feet, and the other for one hundred and fifteen feet along the base of high and dry ground, covered with deciduous trees. Both branches terminate with a vertical cut in dry sandy soil, and are carried through the same low

ground as the main trunk, the surface rising but a few inches above the level of the pond. Of its artificial character there can be no doubt. The measurements are given upon the ground plan.

This canal passed a number of knolls surmounted with trees, under many of which burrows had been excavated. Evidences of this underground work were apparent in many places.

At the distance of about seventy feet from the pond, this canal widens out to five feet, and then bears a little to the left. The engraving (Plate XX.) is from a photograph taken from this point, and looking down toward the pond. It shows the pond and about seventy-five feet of the canal. The lodge is mostly concealed behind the clump of small trees upon the right. The engraving is inaccurate in one respect. It shows the ground too much elevated above the level of the water in the canal. There is one feature of this canal deserving of attention. After the rising ground, and with it the hard-wood trees, were reached at the point where it branched, there was no very urgent necessity for the branches. But their construction along the base of the high ground gave them a frontage upon the canal of two hundred and fifteen feet of hard-wood lands, thus affording to them, along this extended line, the great advantages of water transportation for their cuttings. If we are to regard these extensions as a further expression of their appreciation of the uses of a canal, it must increase our estimate of their powers of reflection.

"Instinct," as that unfortunate and blundering term is understood by those who comprehend its meaning, would have fully performed its office when the canal had been carried to the point of contact with the high ground. Any progress of the work beyond this must be referable to the exercise of a free intelligence.

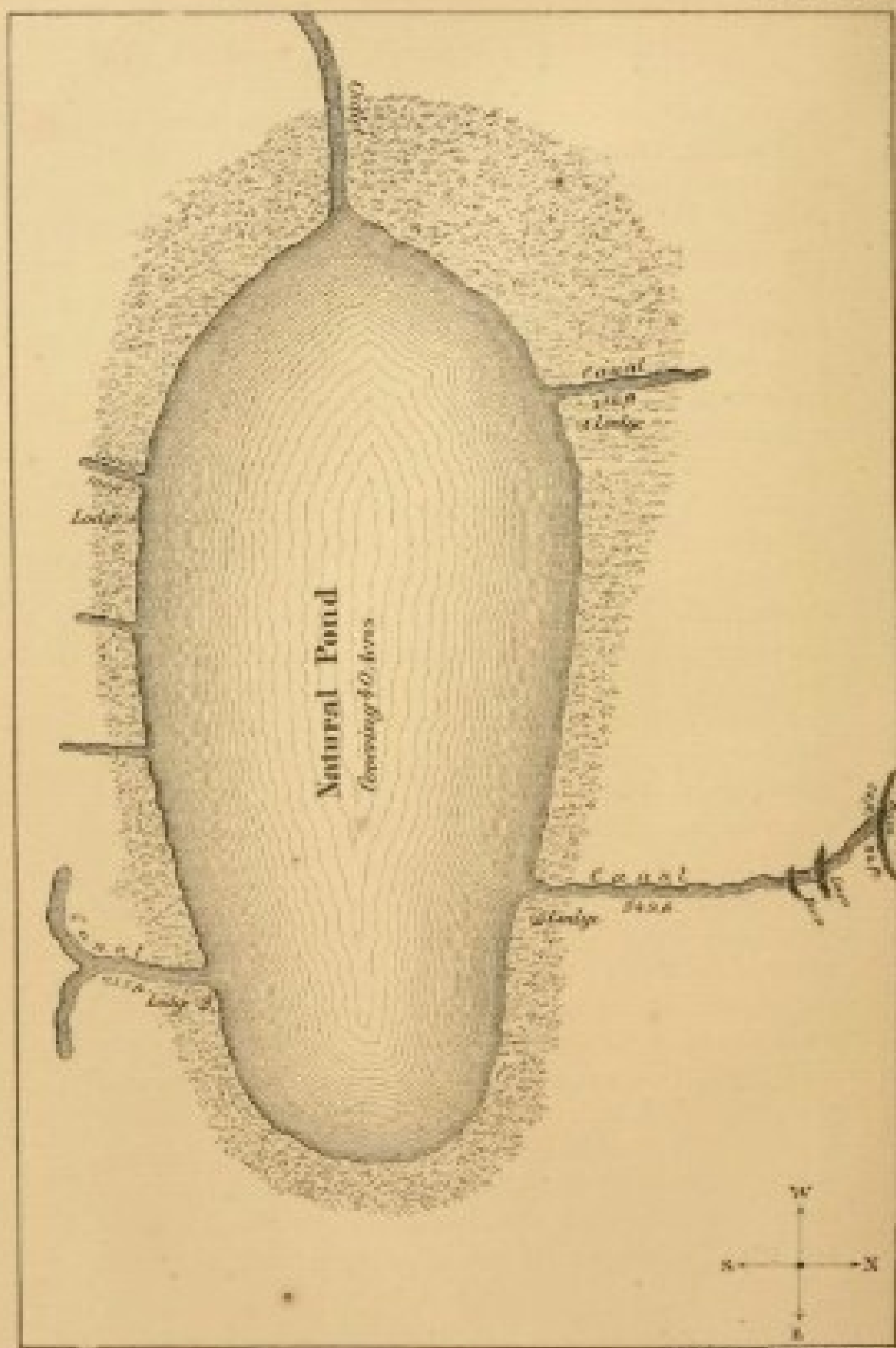
There is an extensive canal on Carp River a short distance below the bend represented in Plate XIV. It runs through low, swampy ground, which is covered, for one-quarter of its length, with a thicket of alder so dense that it was difficult to follow the channel for the purposes of measurement. The river, which at this point is a hundred feet wide, more or less, is bordered with alder and cranberry bushes, and with a forest of tamaracks. Back of these, some six hundred feet, is the first rising ground covered with deciduous trees; to reach which the canal was constructed. At the distance of one hundred and eleven feet from its commencement in the river there was a rise in the surface level of about a foot, which made necessary either a dam, or an additional foot of excavation, to furnish a sufficient depth of water. A dam twenty-five feet long, across the canal and the grounds adjacent, was the expedient adopted. The second level of the canal, thus raised a foot above the first, continued one hundred and seventy-eight feet, where a second rise occurs of about the same amount, and where a second dam was constructed thirty feet long. As the ground on both sides of the canal was swampy, with water in pools here and there, it was only necessary to excavate a channel of the requisite depth to obtain a sufficient supply of water by filtration from the adjoining lands. Up to the first dam the canal was filled from the river, and consequently varied in depth with the rise and fall of the stream; but above this, where it feet to three feet six inches in height. The chamber of the lodge at the canal last described was four feet nine inches in its largest diameter, four feet six inches in its transverse, and one foot three inches high. depended upon the dam, and the source of supply before named, it was uniformly about eighteen inches deep. From the second dam the canal continued at a foot higher level for the distance of two hundred and ninety feet, where it terminated at the base of the hard-wood lands at a distance of five hundred and seventy-nine feet from the river. Its average width was about four feet, and it had an unobstructed channel of about eighteen inches deep from one end to the other, with the exception of the dams. The run-ways of the beavers over

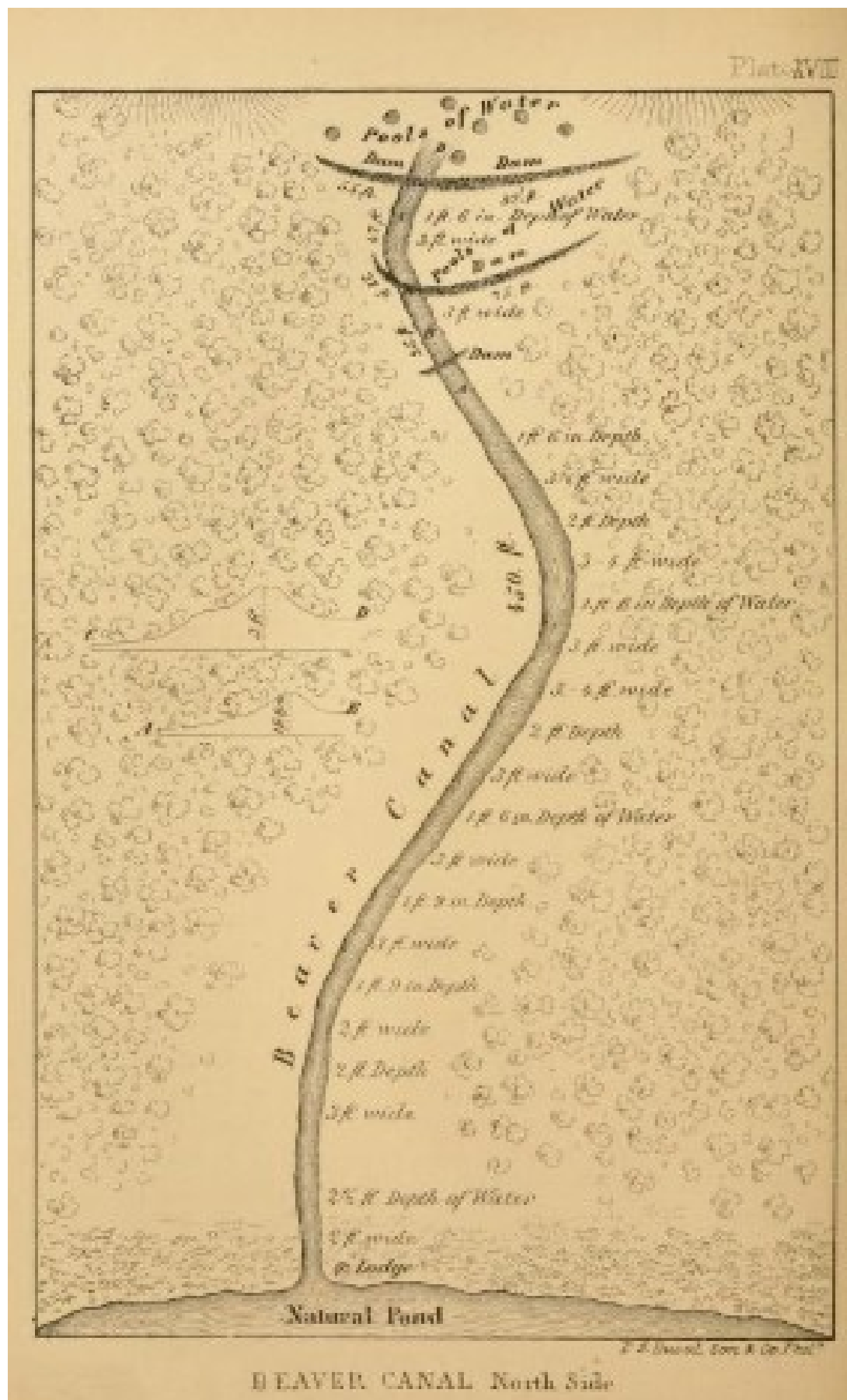
these dams were very conspicuous. They were shown, as in the other cases, by a depression in the centre formed by traveling over them in going up and down the canal. At the mouth of the canal the river was not deep enough for a beaver to swim below its surface out into the stream. To obviate the difficulty, a channel, twenty-five feet long and a foot or more deep, was excavated in the bed of the river far enough out to carry them into deep water. The materials were thrown up in an embankment on the side below the excavation, apparently lest the current of the stream should carry them back into the channel. The excavation and the embankment, which were plainly to be seen side by side, the latter in places coming up to the surface of the water, presented another striking illustration of the industry as well as intelligence of the beaver.

It is manifest from the form and general appearance of this canal (Plate XXI.) that it is artificial. In addition to the uniformity and depth of its channel, its vertical banks, the absence of a current, the sources whence the water is obtained, and its actual use as a channel for the transportation of wood cuttings, there is still other evidence tending to the same conclusion. Along the canal there are roots from two to four inches in diameter cut off at the bank on opposite sides, below the surface of the water, and removed. Alder bushes in great numbers, even when branching across the canal several inches above the ground, are found cut off to free the channel from obstructions. Besides these several considerations, the canal terminates in dry ground; and the intermediate space through which it is carried is of such a character as to preclude the possibility of the formation of such a channel by natural causes. This canal may be regarded as typical of these works. They are usually cut through low, swampy ground where the supply of water is obtained by filtration from the adjacent lands, after forming a channel for its reception. With dams at each change of level to prevent the channel from drawing off the water, they can be carried as far as pools of surface water can be found.

It is not uncommon to find, at bends in streams, canals cut across the neck, apparently to shorten the distance in going up and down by water. One of this kind has been shown (Plate XIV.) in connection with a lodge. There are a number of these canals within the area of the map, three of the largest of which are shown in sections 4 and 28. The engraving (Plate XXII.) is from a photograph of one on the section last named, and it is introduced to show the beaver meadows on the Esconauba as well. It is a view across a bend in this river, showing the stream in the foreground passing by from right to left, and again in the back- ground flowing in the opposite direction. The canal is excavated across the neck, and appears in the right side of the engraving. It is one hundred and eighty- five feet long, three feet wide, and about fifteen inches deep. When the dam below (No. 14) was in repair and the pond full, it would be about four feet wide and three feet deep. No other object for these excavations can be assigned, except to shorten the distance in going up and down the river. There was no hard wood in its vicinity. Alder bushes were growing on both sides of the canal, which were cut away on one side to show the water within it. The evidence is less conclusive that these excavations are artificial than in the case of the canals before described. In some cases similar excavations are made across islands in their ponds, where they are long, for the obvious purpose of saving distance in going around. In the Chippewa River, in Lower Michigan, there is a pond, covering several hundred acres of land, formed by a beaver dam, in which there is a low island of firm earth nearly a mile in length. Across this island there are two such canals about five hundred feet long, excavated by the beavers for the purpose of a water transit over the island. They were described to me, with their dimensions, by the Rev. Mr. Johnson, for many years a missionary among the Ojibwa Indians, who went upon the island and examined them. Beaver excavations on a large scale are very common in districts favorable for their occupation, and they are greatly diversified in character. At the upper end of the principal pond at the gorge, where the

series of dams are found, there is a canal two hundred and fifty feet long, which enters the pond where it is too shallow for a beaver to swim below the surface of the water. To correct this inconvenience a channel was excavated in the bed of the pond for about fifty feet in length, the materials from which were thrown up on either side.





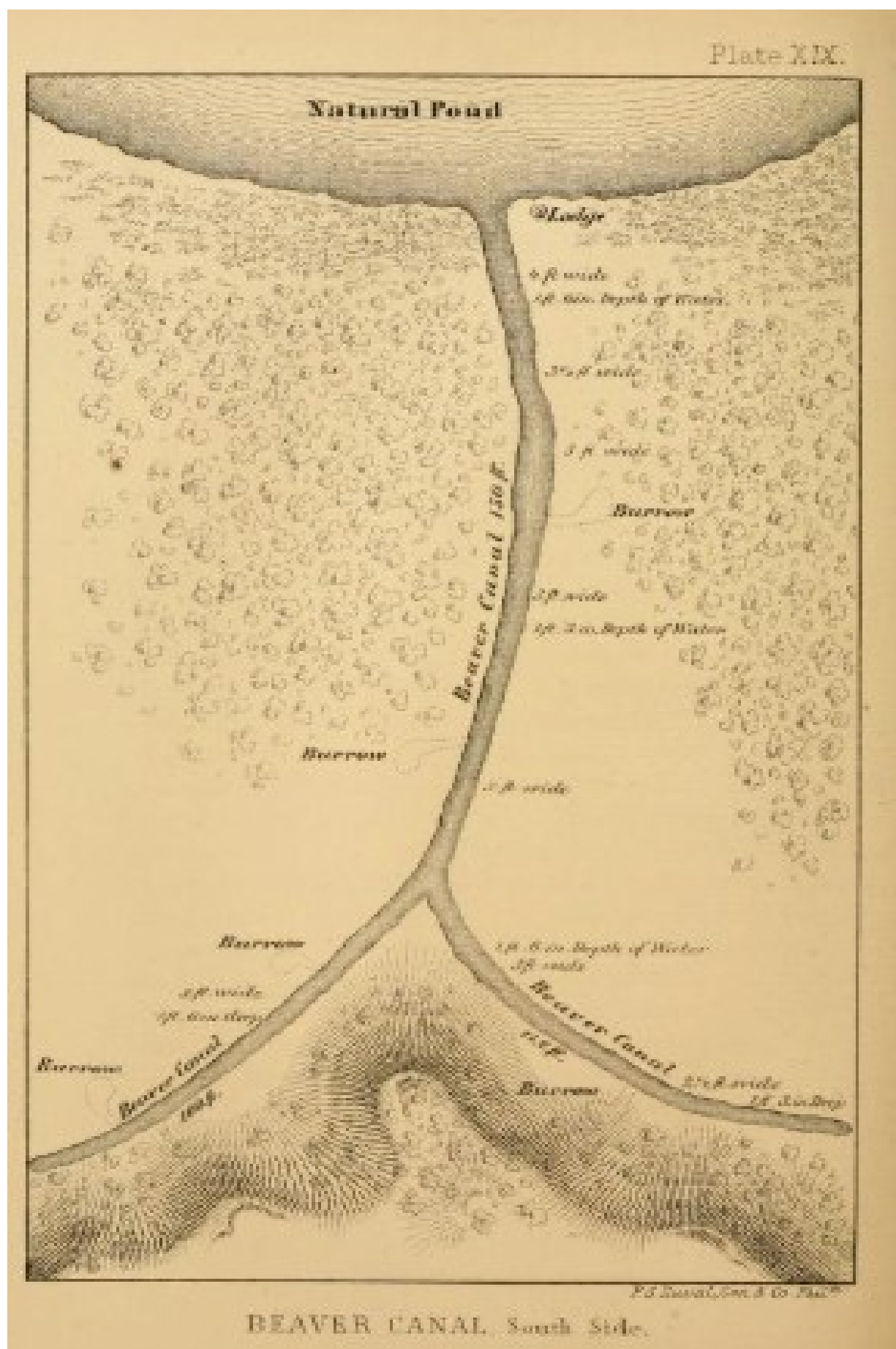


Plate XX.

*From a Photograph.**Ed. Davis, U.S. Geol. Surv.*

BEAVER CANAL South Side

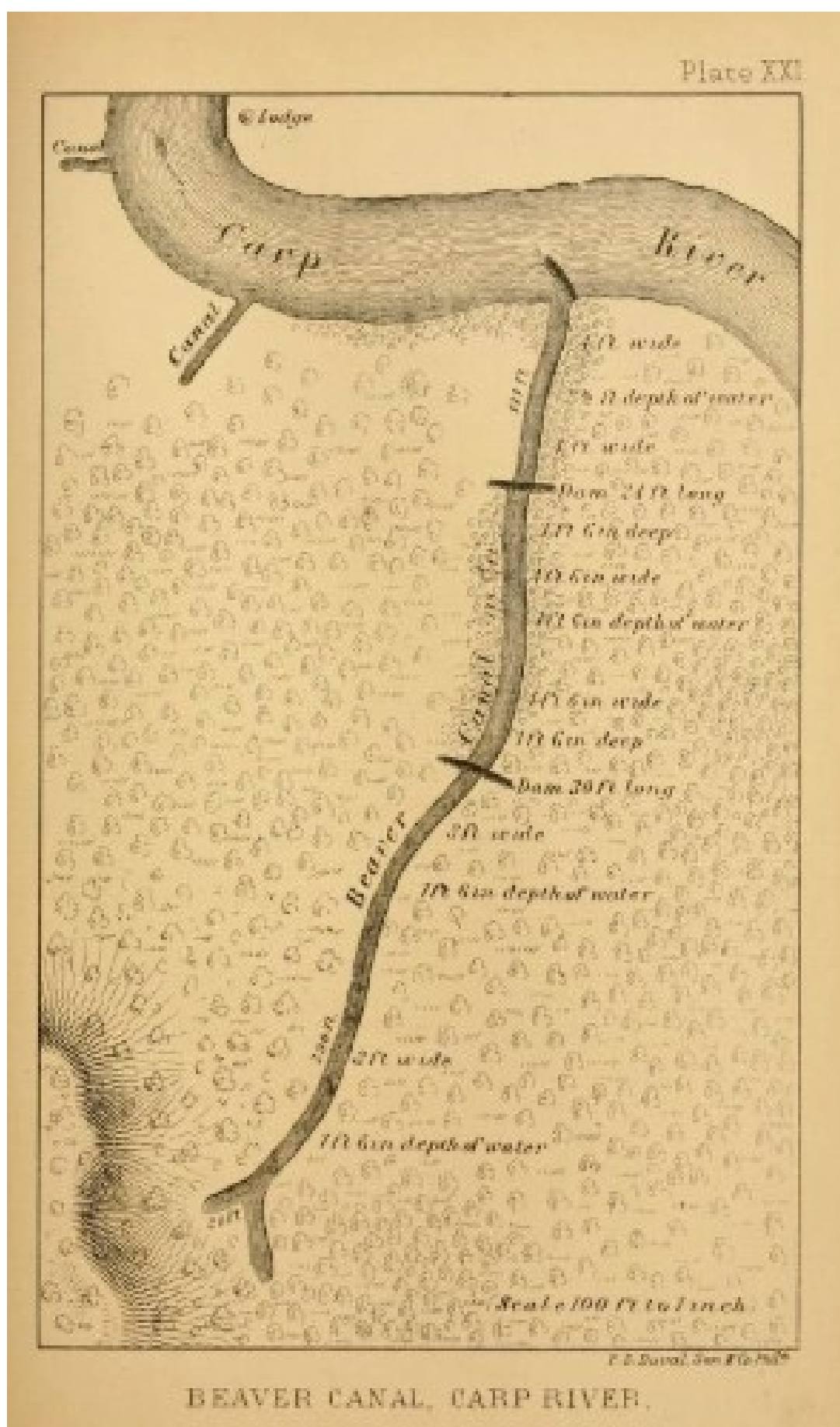


Plate XXII

*From a Photograph**J. L. Buel, Sen. & Co. Phila.*

BEAVER MEADOWS and CANAL

Mutual Aid Among Animals

From: *Mutual Aid: A Factor of Evolution* by Peter Kropotkin

The conception of struggle for existence as a factor of evolution, introduced into science by Darwin and Wallace, has permitted us to embrace an immensely wide range of phenomena in one single generalization, which soon became the very basis of our philosophical, biological, and sociological speculations. An immense variety of facts: — adaptations of function and structure of organic beings to their surroundings; physiological and anatomical evolution; intellectual progress, and moral development itself, which we formerly used to explain by so many different causes, were embodied by Darwin in one general conception. We understood them as continued endeavours — as a struggle against adverse circumstances — for such a development of individuals, races, species and societies, as would result in the greatest possible fulness, variety, and intensity of life. It may be that at the outset Darwin himself was not fully aware of the generality of the factor which he first invoked for explaining one series only of facts relative to the accumulation of individual variations in incipient species. But he foresaw that the term which he was introducing into science would lose its philosophical and its only true meaning if it were to be used in its narrow sense only — that of a struggle between separate individuals for the sheer means of existence. And at the very beginning of his memorable work he insisted upon the term being taken in its “large and metaphorical sense including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny.”

While he himself was chiefly using the term in its narrow sense for his own special purpose, he warned his followers against committing the error (which he seems once to have committed himself) of overrating its narrow meaning. In *The Descent of Man* he

gave some powerful pages to illustrate its proper, wide sense. He pointed out how, in numberless animal societies, the struggle between separate individuals for the means of existence disappears, how struggle is replaced by co-operation, and how that substitution results in the development of intellectual and moral faculties which secure to the species the best conditions for survival. He intimated that in such cases the fittest are not the physically strongest, nor the cunningest, but those who learn to combine so as mutually to support each other, strong and weak alike, for the welfare of the community. “Those communities,” he wrote, “which included the greatest number of the most sympathetic members would flourish best, and rear the greatest number of offspring” (2nd edit., p. 163). The term, which originated from the narrow Malthusian conception of competition between each and all, thus lost its narrowness in the mind of one who knew Nature.

Unhappily, these remarks, which might have become the basis of most fruitful researches, were overshadowed by the masses of facts gathered for the purpose of illustrating the consequences of a real competition for life. Besides, Darwin never attempted to submit to a closer investigation the relative importance of the two aspects under which the struggle for existence appears in the animal world, and he never wrote the work he proposed to write upon the natural checks to over-multiplication, although that work would have been the crucial test for appreciating the real purport of individual struggle. Nay, on the very pages just mentioned, amidst data disproving the narrow Malthusian conception of struggle, the old Malthusian leaven reappeared — namely, in Darwin’s remarks as to the alleged inconveniences of maintaining the “weak in mind and body” in our civilized societies (ch. v). As if thousands of weak-bodied and infirm poets, scientists, inventors, and reformers, together with other thousands of so-called “fools” and “weak-minded enthusiasts,” were not the most precious weapons used by

humanity in its struggle for existence by intellectual and moral arms, which Darwin himself emphasized in those same chapters of *Descent of Man*.

It happened with Darwin's theory as it always happens with theories having any bearing upon human relations. Instead of widening it according to his own hints, his followers narrowed it still more. And while Herbert Spencer, starting on independent but closely allied lines, attempted to widen the inquiry into that great question, "Who are the fittest?" especially in the appendix to the third edition of the *Data of Ethics*, the numberless followers of Darwin reduced the notion of struggle for existence to its narrowest limits. They came to conceive the animal world as a world of perpetual struggle among half-starved individuals, thirsting for one another's blood. They made modern literature resound with the war-cry of woe to the vanquished, as if it were the last word of modern biology. They raised the "pitiless" struggle for personal advantages to the height of a biological principle which man must submit to as well, under the menace of otherwise succumbing in a world based upon mutual extermination. Leaving aside the economists who know of natural science but a few words borrowed from second-hand vulgarizers, we must recognize that even the most authorized exponents of Darwin's views did their best to maintain those false ideas. In fact, if we take Huxley, who certainly is considered as one of the ablest exponents of the theory of evolution, were we not taught by him, in a paper on the 'Struggle for Existence and its Bearing upon Man,' that,

"from the point of view of the moralist, the animal world is on about the same level as a gladiators' show. The creatures are fairly well treated, and set to, fight hereby the

strongest, the swiftest, and the cunningest live to fight another day. The spectator has no need to turn his thumb down, as no quarter is given.”

Or, further down in the same article, did he not tell us that, as among animals, so among primitive men,

“the weakest and stupidest went to the wall, while the toughest and shrewdest, those who were best fitted to cope with their circumstances, but not the best in another way, survived. Life was a continuous free fight, and beyond the limited and temporary relations of the family, the Hobbesian war of each against all was the normal state of existence.”

In how far this view of nature is supported by fact, will be seen from the evidence which will be here submitted to the reader as regards the animal world, and as regards primitive man. But it may be remarked at once that Huxley’s view of nature had as little claim to be taken as a scientific deduction as the opposite view of Rousseau, who saw in nature but love, peace, and harmony destroyed by the accession of man. In fact, the first walk in the forest, the first observation upon any animal society, or even the perusal of any serious work dealing with animal life (D’Orbigny’s, Audubon’s, Le Vaillant’s, no matter which), cannot but set the naturalist thinking about the part taken by social life in the life of animals, and prevent him from seeing in Nature nothing but a field of slaughter, just as this would prevent him from seeing in Nature nothing but harmony and peace. Rousseau had committed the error of excluding the beak-and-claw fight from his thoughts; and Huxley committed the opposite error; but neither Rousseau’s optimism nor Huxley’s pessimism can be accepted as an impartial interpretation of nature.

As soon as we study animals — not in laboratories and museums only, but in the forest and the prairie, in the steppe and the mountains — we at once perceive that though there is an immense amount of warfare and extermination going on amidst various species, and especially amidst various classes of animals, there is, at the same time, as much, or perhaps even more, of mutual support, mutual aid, and mutual defence amidst animals belonging to the same species or, at least, to the same society. Sociability is as much a law of nature as mutual struggle. Of course it would be extremely difficult to estimate, however roughly, the relative numerical importance of both these series of facts. But if we resort to an indirect test, and ask Nature: “Who are the fittest: those who are continually at war with each other, or those who support one another?” we at once see that those animals which acquire habits of mutual aid are undoubtedly the fittest. They have more chances to survive, and they attain, in their respective classes, the highest development of intelligence and bodily organization. If the numberless facts which can be brought forward to support this view are taken into account, we may safely say that mutual aid is as much a law of animal life as mutual struggle, but that, as a factor of evolution, it most probably has a far greater importance, inasmuch as it favours the development of such habits and characters as insure the maintenance and further development of the species, together with the greatest amount of welfare and enjoyment of life for the individual, with the least waste of energy.

Of the scientific followers of Darwin, the first, as far as I know, who understood the full purport of Mutual Aid as a law of Nature and the chief factor of evolution, was a well-known Russian zoologist, the late Dean of the St. Petersburg University, Professor Kessler. He developed his ideas in an address which he delivered in January 1880, a few months before his death, at a Congress of Russian naturalists; but, like so many good

things published in the Russian tongue only, that remarkable address remains almost entirely unknown.

“As a zoologist of old standing,” he felt bound to protest against the abuse of a term — the struggle for existence — borrowed from zoology, or, at least, against overrating its importance. Zoology, he said, and those sciences which deal with man, continually insist upon what they call the pitiless law of struggle for existence. But they forget the existence of another law which may be described as the law of mutual aid, which law, at least for the animals, is far more essential than the former. He pointed out how the need of leaving progeny necessarily brings animals together, and, “the more the individuals keep together, the more they mutually support each other, and the more are the chances of the species for surviving, as well as for making further progress in its intellectual development.” “All classes of animals,” he continued, “and especially the higher ones, practise mutual aid,” and he illustrated his idea by examples borrowed from the life of the burying beetles and the social life of birds and some mammalia. The examples were few, as might have been expected in a short opening address, but the chief points were clearly stated; and, after mentioning that in the evolution of mankind mutual aid played a still more prominent part, Professor Kessler concluded as follows: —

“I obviously do not deny the struggle for existence, but I maintain that the progressive development of the animal kingdom, and especially of mankind, is favoured much more by mutual support than by mutual struggle.... All organic beings have two essential needs: that of nutrition, and that of propagating the species. The former brings them to a struggle and to mutual extermination, while the needs of maintaining the species bring them to approach one another and to support one another. But I am inclined to think that

in the evolution of the organic world — in the progressive modification of organic beings — mutual support among individuals plays a much more important part than their mutual struggle.”

The correctness of the above views struck most of the Russian zoologists present, and Syevertsoff, whose work is well known to ornithologists and geographers, supported them and illustrated them by a few more examples. He mentioned some of the species of falcons which have “an almost ideal organization for robbery,” and nevertheless are in decay, while other species of falcons, which practise mutual help, do thrive. “Take, on the other side, a sociable bird, the duck,” he said; “it is poorly organized on the whole, but it practises mutual support, and it almost invades the earth, as may be judged from its numberless varieties and species.”

The readiness of the Russian zoologists to accept Kessler’s views seems quite natural, because nearly all of them have had opportunities of studying the animal world in the wide uninhabited regions of Northern Asia and East Russia; and it is impossible to study like regions without being brought to the same ideas. I recollect myself the impression produced upon me by the animal world of Siberia when I explored the Vitim regions in the company of so accomplished a zoologist as my friend Polyakoff was. We both were under the fresh impression of the *Origin of Species*, but we vainly looked for the keen competition between animals of the same species which the reading of Darwin’s work had prepared us to expect, even after taking into account the remarks of the third chapter (p. 54). We saw plenty of adaptations for struggling, very often in common, against the adverse circumstances of climate, or against various enemies, and Polyakoff wrote many a good page upon the mutual dependency of carnivores, ruminants, and rodents in their

geographical distribution; we witnessed numbers of facts of mutual support, especially during the migrations of birds and ruminants; but even in the Amur and Usuri regions, where animal life swarms in abundance, facts of real competition and struggle between higher animals of the same species came very seldom under my notice, though I eagerly searched for them. The same impression appears in the works of most Russian zoologists, and it probably explains why Kessler's ideas were so welcomed by the Russian Darwinists, whilst like ideas are not in vogue amidst the followers of Darwin in Western Europe.

The first thing which strikes us as soon as we begin studying the struggle for existence under both its aspects — direct and metaphorical — is the abundance of facts of mutual aid, not only for rearing progeny, as recognized by most evolutionists, but also for the safety of the individual, and for providing it with the necessary food. With many large divisions of the animal kingdom mutual aid is the rule. Mutual aid is met with even amidst the lowest animals, and we must be prepared to learn some day, from the students of microscopical pond-life, facts of unconscious mutual support, even from the life of micro-organisms. Of course, our knowledge of the life of the invertebrates, save the termites, the ants, and the bees, is extremely limited; and yet, even as regards the lower animals, we may glean a few facts of well-ascertained cooperation. The numberless associations of locusts, vanessae, cicindela, cicadae, and so on, are practically quite unexplored; but the very fact of their existence indicates that they must be composed on about the same principles as the temporary associations of ants or bees for purposes of migration. As to the beetles, we have quite well-observed facts of mutual help amidst the burying beetles (*Necrophorus*). They must have some decaying organic matter to lay their eggs in, and thus to provide their larvæ with food; but that matter must not decay very rapidly. So they are wont to bury in the ground the corpses of all kinds of small

animals which they occasionally find in their rambles. As a rule, they live an isolated life, but when one of them has discovered the corpse of a mouse or of a bird, which it hardly could manage to bury itself, it calls four, six, or ten other beetles to perform the operation with united efforts; if necessary, they transport the corpse to a suitable soft ground; and they bury it in a very considerate way, without quarrelling as to which of them will enjoy the privilege of laying its eggs in the buried corpse. And when Gleditsch attached a dead bird to a cross made out of two sticks, or suspended a toad to a stick planted in the soil, the little beetles would in the same friendly way combine their intelligences to overcome the artifice of Man. The same combination of efforts has been noticed among the dung-beetles.

Even among animals standing at a somewhat lower stage of organization we may find like examples. Some land-crabs of the West Indies and North America combine in large swarms in order to travel to the sea and to deposit therein their spawn; and each such migration implies concert, co-operation, and mutual support. As to the big Molucca crab (*Limulus*), I was struck (in 1882, at the Brighton Aquarium) with the extent of mutual assistance which these clumsy animals are capable of bestowing upon a comrade in case of need. One of them had fallen upon its back in a corner of the tank, and its heavy saucepan-like carapace prevented it from returning to its natural position, the more so as there was in the corner an iron bar which rendered the task still more difficult. Its comrades came to the rescue, and for one hour's time I watched how they endeavoured to help their fellow-prisoner. They came two at once, pushed their friend from beneath, and after strenuous efforts succeeded in lifting it upright; but then the iron bar would prevent them from achieving the work of rescue, and the crab would again heavily fall upon its back. After many attempts, one of the helpers would go in the depth of the tank and bring two other crabs, which would begin with fresh forces the same pushing and

lifting of their helpless comrade. We stayed in the Aquarium for more than two hours, and, when leaving, we again came to cast a glance upon the tank: the work of rescue still continued! Since I saw that, I cannot refuse credit to the observation quoted by Dr. Erasmus Darwin — namely, that “the common crab during the moulting season stations as sentinel an unmoulted or hard-shelled individual to prevent marine enemies from injuring moulted individuals in their unprotected state.”

Facts illustrating mutual aid amidst the termites, the ants, and the bees are so well known to the general reader, especially through the works of Romanes, L. Büchner, and Sir John Lubbock, that I may limit my remarks to a very few hints. If we take an ants' nest, we not only see that every description of work-rearing of progeny, foraging, building, rearing of aphides, and so on — is performed according to the principles of voluntary mutual aid; we must also recognize, with Forel, that the chief, the fundamental feature of the life of many species of ants is the fact and the obligation for every ant of sharing its food, already swallowed and partly digested, with every member of the community which may apply for it. Two ants belonging to two different species or to two hostile nests, when they occasionally meet together, will avoid each other. But two ants belonging to the same nest or to the same colony of nests will approach each other, exchange a few movements with the antennæ, and “if one of them is hungry or thirsty, and especially if the other has its crop full... it immediately asks for food.” The individual thus requested never refuses; it sets apart its mandibles, takes a proper position, and regurgitates a drop of transparent fluid which is licked up by the hungry ant. Regurgitating food for other ants is so prominent a feature in the life of ants (at liberty), and it so constantly recurs both for feeding hungry comrades and for feeding larvæ, that Forel considers the digestive tube of the ants as consisting of two different parts, one of which, the posterior, is for the special use of the individual, and the other,

the anterior part, is chiefly for the use of the community. If an ant which has its crop full has been selfish enough to refuse feeding a comrade, it will be treated as an enemy, or even worse. If the refusal has been made while its kinsfolk were fighting with some other species, they will fall back upon the greedy individual with greater vehemence than even upon the enemies themselves. And if an ant has not refused to feed another ant belonging to an enemy species, it will be treated by the kinsfolk of the latter as a friend. All this is confirmed by most accurate observation and decisive experiments.

In that immense division of the animal kingdom which embodies more than one thousand species, and is so numerous that the Brazilians pretend that Brazil belongs to the ants, not to men, competition amidst the members of the same nest, or the colony of nests, does not exist. However terrible the wars between different species, and whatever the atrocities committed at war-time, mutual aid within the community, self-devotion grown into a habit, and very often self-sacrifice for the common welfare, are the rule. The ants and termites have renounced the “Hobbesian war,” and they are the better for it. Their wonderful nests, their buildings, superior in relative size to those of man; their paved roads and overground vaulted galleries; their spacious halls and granaries; their corn-fields, harvesting and “malting” of grain; their, rational methods of nursing their eggs and larvæ, and of building special nests for rearing the aphides whom Linnæus so picturesquely described as “the cows of the ants”; and, finally, their courage, pluck, and, superior intelligence — all these are the natural outcome of the mutual aid which they practise at every stage of their busy and laborious lives. That mode of life also necessarily resulted in the development of another essential feature of the life of ants: the immense development of individual initiative which, in its turn, evidently led to the development of that high and varied intelligence which cannot but strike the human observer.

If we knew no other facts from animal life than what we know about the ants and the termites, we already might safely conclude that mutual aid (which leads to mutual confidence, the first condition for courage) and individual initiative (the first condition for intellectual progress) are two factors infinitely more important than mutual struggle in the evolution of the animal kingdom. In fact, the ant thrives without having any of the “protective” features which cannot be dispensed with by animals living an isolated life. Its colour renders it conspicuous to its enemies, and the lofty nests of many species are conspicuous in the meadows and forests. It is not protected by a hard carapace, and its stinging apparatus, however dangerous when hundreds of stings are plunged into the flesh of an animal, is not of a great value for individual defence; while the eggs and larvæ of the ants are a dainty for a great number of the inhabitants of the forests. And yet the ants, in their thousands, are not much destroyed by the birds, not even by the ant-eaters, and they are dreaded by most stronger insects. When Forel emptied a bagful of ants in a meadow, he saw that “the crickets ran away, abandoning their holes to be sacked by the ants; the grasshoppers and the crickets fled in all directions; the spiders and the beetles abandoned their prey in order not to become prey themselves;” even the nests of the wasps were taken by the ants, after a battle during which many ants perished for the safety of the commonwealth. Even the swiftest insects cannot escape, and Forel often saw butterflies, gnats, flies, and so on, surprised and killed by the ants. Their force is in mutual support and mutual confidence. And if the ant — apart from the still higher developed termites — stands at the very top of the whole class of insects for its intellectual capacities; if its courage is only equalled by the most courageous vertebrates; and if its brain — to use Darwin’s words — “is one of the most marvellous atoms of matter in the world, perhaps more so than the brain of man,” is it not due to the fact that mutual aid has entirely taken the place of mutual struggle in the communities of ants?

The same is true as regards the bees. These small insects, which so easily might become the prey of so many birds, and whose honey has so many admirers in all classes of animals from the beetle to the bear, also have none of the protective features derived from mimicry or otherwise, without which an isolatedly living insect hardly could escape wholesale destruction; and yet, owing to the mutual aid they practise, they obtain the wide extension which we know and the intelligence we admire. By working in common they multiply their individual forces; by resorting to a temporary division of labour combined with the capacity of each bee to perform every kind of work when required, they attain such a degree of well-being and safety as no isolated animal can ever expect to achieve however strong or well armed it may be. In their combinations they are often more successful than man, when he neglects to take advantage of a well-planned mutual assistance. Thus, when a new swarm of bees is going to leave the hive in search of a new abode, a number of bees will make a preliminary exploration of the neighbourhood, and if they discover a convenient dwelling-place — say, an old basket, or anything of the kind — they will take possession of it, clean it, and guard it, sometimes for a whole week, till the swarm comes to settle therein. But how many human settlers will perish in new countries simply for not having understood the necessity of combining their efforts! By combining their individual intelligences they succeed in coping with adverse circumstances, even quite unforeseen and unusual, like those bees of the Paris Exhibition which fastened with their resinous propolis the shutter to a glass-plate fitted in the wall of their hive. Besides, they display none of the sanguinary proclivities and love of useless fighting with which many writers so readily endow animals. The sentries which guard the entrance to the hive pitilessly put to death the robbing bees which attempt entering the hive; but those stranger bees which come to the hive by mistake are left unmolested, especially if they come laden with pollen, or are

young individuals which can easily go astray. There is no more warfare than is strictly required.

The sociability of the bees is the more instructive as predatory instincts and laziness continue to exist among the bees as well, and reappear each time that their growth is favoured by some circumstances. It is well known that there always are a number of bees which prefer a life of robbery to the laborious life of a worker; and that both periods of scarcity and periods of an unusually rich supply of food lead to an increase of the robbing class. When our crops are in and there remains but little to gather in our meadows and fields, robbing bees become of more frequent occurrence; while, on the other side, about the sugar plantations of the West Indies and the sugar refineries of Europe, robbery, laziness, and very often drunkenness become quite usual with the bees. We thus see that anti-social instincts continue to exist amidst the bees as well; but natural selection continually must eliminate them, because in the long run the practice of solidarity proves much more advantageous to the species than the development of individuals endowed with predatory inclinations. The cunningest and the shrewdest are eliminated in favour of those who understand the advantages of sociable life and mutual support.

Certainly, neither the ants, nor the bees, nor even the termites, have risen to the conception of a higher solidarity embodying the whole of the species. In that respect they evidently have not attained a degree of development which we do not find even among our political, scientific, and religious leaders. Their social instincts hardly extend beyond the limits of the hive or the nest. However, colonies of no less than two hundred nests, belonging to two different species (*Formica exsecta* and *F. pressilabris*) have been

described by Forel on Mount Tendre and Mount Salève; and Forel maintains that each member of these colonies recognizes every other member of the colony, and that they all take part in common defence; while in Pennsylvania Mr. MacCook saw a whole nation of from 1,600 to 1,700 nests of the mound-making ant, all living in perfect intelligence; and Mr. Bates has described the hillocks of the termites covering large surfaces in the “campos” — some of the nests being the refuge of two or three different species, and most of them being connected by vaulted galleries or arcades. Some steps towards the amalgamation of larger divisions of the species for purposes of mutual protection are thus met with even among the invertebrate animals.

Going now over to higher animals, we find far more instances of undoubtedly conscious mutual help for all possible purposes, though we must recognize at once that our knowledge even of the life of higher animals still remains very imperfect. A large number of facts have been accumulated by first-rate observers, but there are whole divisions of the animal kingdom of which we know almost nothing. Trustworthy information as regards fishes is extremely scarce, partly owing to the difficulties of observation, and partly because no proper attention has yet been paid to the subject. As to the mammalia, Kessler already remarked how little we know about their manners of life. Many of them are nocturnal in their habits; others conceal themselves underground; and those ruminants whose social life and migrations offer the greatest interest do not let man approach their herds. It is chiefly upon birds that we have the widest range of information, and yet the social life of very many species remains but imperfectly known. Still, we need not complain about the lack of well-ascertained facts, as will be seen from the following.

I need not dwell upon the associations of male and female for rearing their offspring, for providing it with food during their first steps in life, or for hunting in common; though it may be mentioned by the way that such associations are the rule even with the least sociable carnivores and rapacious birds; and that they derive a special interest from being the field upon which tenderer feelings develop even amidst otherwise most cruel animals. It may also be added that the rarity of associations larger than that of the family among the carnivores and the birds of prey, though mostly being the result of their very modes of feeding, can also be explained to some extent as a consequence of the change produced in the animal world by the rapid increase of mankind. At any rate it is worthy of note that there are species living a quite isolated life in densely-inhabited regions, while the same species, or their nearest congeners, are gregarious in uninhabited countries. Wolves, foxes, and several birds of prey may be quoted as instances in point.

However, associations which do not extend beyond the family bonds are of relatively small importance in our case, the more so as we know numbers of associations for more general purposes, such as hunting, mutual protection, and even simple enjoyment of life. Audubon already mentioned that eagles occasionally associate for hunting, and his description of the two bald eagles, male and female, hunting on the Mississippi, is well known for its graphic powers. But one of the most conclusive observations of the kind belongs to Syevertoff. Whilst studying the fauna of the Russian Steppes, he once saw an eagle belonging to an altogether gregarious species (the white-tailed eagle, *Haliaetos albicilla*) rising high in the air for half an hour it was describing its wide circles in silence when at once its piercing voice was heard. Its cry was soon answered by another eagle which approached it, and was followed by a third, a fourth, and so on, till nine or ten eagles came together and soon disappeared. In the afternoon, Syevertoff went to the place whereto he saw the eagles flying; concealed by one of the undulations of the

Steppe, he approached them, and discovered that they had gathered around the corpse of a horse. The old ones, which, as a rule, begin the meal first — such are their rules of propriety -- already were sitting upon the haystacks of the neighbourhood and kept watch, while the younger ones were continuing the meal, surrounded by bands of crows. From this and like observations, Syevertsoff concluded that the white-tailed eagles combine for hunting; when they all have risen to a great height they are enabled, if they are ten, to survey an area of at least twenty-five miles square; and as soon as any one has discovered something, he warns the others. Of course, it might be argued that a simple instinctive cry of the first eagle, or even its movements, would have had the same effect of bringing several eagles to the prey, but in this case there is strong evidence in favour of mutual warning, because the ten eagles came together before descending towards the prey, and Syevertsoff had later on several opportunities of ascertaining that the whitetailed eagles always assemble for devouring a corpse, and that some of them (the younger ones first) always keep watch while the others are eating. In fact, the white-tailed eagle — one of the bravest and best hunters — is a gregarious bird altogether, and Brehm says that when kept in captivity it very soon contracts an attachment to its keepers.

Sociability is a common feature with very many other birds of prey. The Brazilian kite, one of the most “impudent” robbers, is nevertheless a most sociable bird. Its hunting associations have been described by Darwin and other naturalists, and it is a fact that when it has seized upon a prey which is too big, it calls together five or six friends to carry it away. After a busy day, when these kites retire for their night-rest to a tree or to the bushes, they always gather in bands, sometimes coming together from distances of ten or more miles, and they often are joined by several other vultures, especially the percnopters, “their true friends,” D’Orbigny says. In another continent, in the

Transcaspian deserts, they have, according to Zarudnyi, the same habit of nesting together. The sociable vulture, one of the strongest vultures, has received its very name from its love of society. They live in numerous bands, and decidedly enjoy society; numbers of them join in their high flights for sport. “They live in very good friendship,” Le Vaillant says, “and in the same cave I sometimes found as many as three nests close together.” The Urubú vultures of Brazil are as, or perhaps even more, sociable than rooks. The little Egyptian vultures live in close friendship. They play in bands in the air, they come together to spend the night, and in the morning they all go together to search for their food, and never does the slightest quarrel arise among them; such is the testimony of Brehm, who had plenty of opportunities of observing their life. The red-throated falcon is also met with in numerous bands in the forests of Brazil, and the kestrel (*Tinnunculus cenchris*), when it has left Europe, and has reached in the winter the prairies and forests of Asia, gathers in numerous societies. In the Steppes of South Russia it is (or rather was) so sociable that Nordmann saw them in numerous bands, with other falcons (*Falco tinnunculus*, *F. æsulon*, and *F. subbuteo*), coming together every fine afternoon about four o’clock, and enjoying their sports till late in the night. They set off flying, all at once, in a quite straight line, towards some determined point, and having reached it, immediately returned over the same line, to repeat the same flight.

To take flights in flocks for the mere pleasure of the flight, is quite common among all sorts of birds. “In the Humber district especially,” Ch. Dixon writes, “vast flights of dunlins often appear upon the mud-flats towards the end of August, and remain for the winter.... The movements of these birds are most interesting, as a vast flock wheels and spreads out or closes up with as much precision as drilled troops. Scattered among them are many odd stints and sanderlings and ringed-plovers.”

It would be quite impossible to enumerate here the various hunting associations of birds; but the fishing associations of the pelicans are certainly worthy of notice for the remarkable order and intelligence displayed by these clumsy birds. They always go fishing in numerous bands, and after having chosen an appropriate bay, they form a wide half-circle in face of the shore, and narrow it by paddling towards the shore, catching all fish that happen to be enclosed in the circle. On narrow rivers and canals they even divide into two parties, each of which draws up on a half-circle, and both paddle to meet each other, just as if two parties of men dragging two long nets should advance to capture all fish taken between the nets when both parties come to meet. As the night comes they fly to their resting-places — always the same for each flock — and no one has ever seen them fighting for the possession of either the bay or the resting place. In South America they gather in flocks of from forty to fifty thousand individuals, part of which enjoy sleep while the others keep watch, and others again go fishing. And finally, I should be doing an injustice to the much-calumniated house-sparrows if I did not mention how faithfully each of them shares any food it discovers with all members of the society to which it belongs. The fact was known to the Greeks, and it has been transmitted to posterity how a Greek orator once exclaimed (I quote from memory): — “While I am speaking to you a sparrow has come to tell to other sparrows that a slave has dropped on the floor a sack of corn, and they all go there to feed upon the grain.” The more, one is pleased to find this observation of old confirmed in a recent little book by Mr. Gurney, who does not doubt that the house sparrows always inform each other as to where there is some food to steal; he says, “When a stack has been thrashed ever so far from the yard, the sparrows in the yard have always had their crops full of the grain.” True, the sparrows are extremely particular in keeping their domains free from the invasions of strangers; thus the sparrows of the Jardin du Luxembourg bitterly fight all other sparrows which may attempt to enjoy their turn of the garden and its visitors; but

within their own communities they fully practise mutual support, though occasionally there will be of course some quarrelling even amongst the best friends.

Hunting and feeding in common is so much the habit in the feathered world that more quotations hardly would be needful: it must be considered as an established fact. As to the force derived from such associations, it is self-evident. The strongest birds of prey are powerless in face of the associations of our smallest bird pets. Even eagles — even the powerful and terrible booted eagle, and the martial eagle, which is strong enough to carry away a hare or a young antelope in its claws — are compelled to abandon their prey to bands of those beggars the kites, which give the eagle a regular chase as soon as they see it in possession of a good prey. The kites will also give chase to the swift fishing-hawk, and rob it of the fish it has captured; but no one ever saw the kites fighting together for the possession of the prey so stolen. On the Kerguelen Island, Dr. Couës saw the gulls to Buphagus — the sea-hen of the sealers — pursue gulls to make them disgorge their food, while, on the other side, the gulls and the terns combined to drive away the sea-hen as soon as it came near to their abodes, especially at nesting-time. The little, but extremely swift lapwings (*Vanellus cristatus*) boldly attack the birds of prey. “To see them attacking a buzzard, a kite, a crow, or an eagle, is one of the most amusing spectacles. One feels that they are sure of victory, and one sees the anger of the bird of prey. In such circumstances they perfectly support one another, and their courage grows with their numbers. The lapwing has well merited the name of a “good mother” which the Greeks gave to it, for it never fails to protect other aquatic birds from the attacks of their enemies. But even the little white wagtails (*Motacilla alba*), whom we well know in our gardens and whose whole length hardly attains eight inches, compel the sparrow-hawk to abandon its hunt. “I often admired their courage and agility,” the old Brehm wrote, “and I am persuaded that the falcon alone is capable of capturing any of them....

When a band of wagtails has compelled a bird of prey to retreat, they make the air resound with their triumphant cries, and after that they separate. “They thus come together for the special purpose of giving chase to their enemy, just as we see it when the whole bird-population of a forest has been raised by the news that a nocturnal bird has made its appearance during the day, and all together — birds of prey and small inoffensive singers — set to chase the stranger and make it return to its concealment.

What an immense difference between the force of a kite, a buzzard or a hawk, and such small birds as the meadow-wagtail; and yet these little birds, by their common action and courage, prove superior to the powerfully-winged and armed robbers! In Europe, the wagtails not only chase the birds of prey which might be dangerous to them, but they chase also the fishing-hawk “rather for fun than for doing it any harm;” while in India, according to Dr. Jerdon’s testimony, the jackdaws chase the gowinda-kite “for simple matter of amusement.” Prince Wied saw the Brazilian eagle urubitinga surrounded by numberless flocks of toucans and cassiques (a bird nearly akin to our rook), which mocked it. “The eagle,” he adds, “usually supports these insults very quietly, but from time to time it will catch one of these mockers.” In all such cases the little birds, though very much inferior in force to the bird of prey, prove superior to it by their common action.

However, the most striking effects of common life for the security of the individual, for its enjoyment of life, and for the development of its intellectual capacities, are seen in two great families of birds, the cranes and the parrots. The cranes are extremely sociable and live in most excellent relations, not only with their congeners, but also with most aquatic birds. Their prudence is really astonishing, so also their intelligence; they grasp the new conditions in a moment, and act accordingly. Their sentries always keep watch around a flock which is feeding or resting, and the hunters know well how difficult it is

to approach them. If man has succeeded in surprising them, they will never return to the same place without having sent out one single scout first, and a party of scouts afterwards; and when the reconnoitring party returns and reports that there is no danger, a second group of scouts is sent out to verify the first report, before the whole band moves. With kindred species the cranes contract real friendship; and in captivity there is no bird, save the also sociable and highly intelligent parrot, which enters into such real friendship with man. "It sees in man, not a master, but a friend, and endeavours to manifest it," Brehm concludes from a wide personal experience. The crane is in continual activity from early in the morning till late in the night; but it gives a few hours only in the morning to the task of searching its food, chiefly vegetable. All the remainder of the day is given to society life. "It picks up small pieces of wood or small stones, throws them in the air and tries to catch them; it bends its neck, opens its wings, dances, jumps, runs about, and tries to manifest by all means its good disposition of mind, and always it remains graceful and beautiful." As it lives in society it has almost no enemies, and though Brehm occasionally saw one of them captured by a crocodile, he wrote that except the crocodile he knew no enemies of the crane. It eschews all of them by its proverbial prudence; and it attains, as a rule, a very old age. No wonder that for the maintenance of the species the crane need not rear a numerous offspring; it usually hatches but two eggs. As to its superior intelligence, it is sufficient to say that all observers are unanimous in recognizing that its intellectual capacities remind one very much of those of man.

The other extremely sociable bird, the parrot, stands, as known, at the very top of the whole feathered world for the development of its intelligence. Brehm has so admirably summed up the manners of life of the parrot, that I cannot do better than translate the following sentence: —

“Except in the pairing season, they live in very numerous societies or bands. They choose a place in the forest to stay there, and thence they start every morning for their hunting expeditions. The members of each band remain faithfully attached to each other, and they share in common good or bad luck. All together they repair in the morning to a field, or to a garden, or to a tree, to feed upon fruits. They post sentries to keep watch over the safety of the whole band, and are attentive to their warnings. In case of danger, all take to flight, mutually supporting each other, and all simultaneously return to their resting-place. In a word, they always live closely united.”

They enjoy society of other birds as well. In India, the jays and crows come together from many miles round, to spend the night in company with the parrots in the bamboo thickets. When the parrots start hunting, they display the most wonderful intelligence, prudence, and capacity of coping with circumstances. Take, for instance, a band of white cacadoos in Australia. Before starting to plunder a corn-field, they first send out a reconnoitring party which occupies the highest trees in the vicinity of the field, while other scouts perch upon the intermediate trees between the field and the forest and transmit the signals. If the report runs “All right,” a score of cacadoos will separate from the bulk of the band, take a flight in the air, and then fly towards the trees nearest to the field. They also will scrutinize the neighbourhood for a long while, and only then will they give the signal for general advance, after which the whole band starts at once and plunders the field in no time. The Australian settlers have the greatest difficulties in beguiling the prudence of the parrots; but if man, with all his art and weapons, has succeeded in killing some of them, the cacadoos become so prudent and watchful that they henceforward baffle all stratagems.

There can be no doubt that it is the practice of life in society which enables the parrots to attain that very high level of almost human intelligence and almost human feelings which we know in them. Their high intelligence has induced the best naturalists to describe some species, namely the grey parrot, as the “birdman.” As to their mutual attachment it is known that when a parrot has been killed by a hunter, the others fly over the corpse of their comrade with shrieks of complaints and “themselves fall the victims of their friendship,” as Audubon said; and when two captive parrots, though belonging to two different species, have contracted mutual friendship, the accidental death of one of the two friends has sometimes been followed by the death from grief and sorrow of the other friend. It is no less evident that in their societies they find infinitely more protection than they possibly might find in any ideal development of beak and claw. Very few birds of prey or mammals dare attack any but the smaller species of parrots, and Brehm is absolutely right in saying of the parrots, as he also says of the cranes and the sociable monkeys, that they hardly have any enemies besides men; and he adds: “It is most probable that the larger parrots succumb chiefly to old age rather than die from the claws of any enemies.” Only man, owing to his still more superior intelligence and weapons, also derived from association, succeeds in partially destroying them. Their very longevity would thus appear as a result of their social life. Could we not say the same as regards their wonderful memory, which also must be favoured in its development by society — life and by longevity accompanied by a full enjoyment of bodily and mental faculties till a very old age?

As seen from the above, the war of each against all is not the law of nature. Mutual aid is as much a law of nature as mutual struggle, and that law will become still more apparent when we have analyzed some other associations of birds and those of the

mammalia. A few hints as to the importance of the law of mutual aid for the evolution of the animal kingdom have already been given in the preceding pages; but their purport will still better appear when, after having given a few more illustrations, we shall be enabled presently to draw therefrom our conclusions.

As soon as spring comes back to the temperate zone, myriads and myriads of birds which are scattered over the warmer regions of the South come together in numberless bands, and, full of vigour and joy, hasten northwards to rear their offspring. Each of our hedges, each grove, each ocean cliff, and each of the lakes and ponds with which Northern America, Northern Europe, and Northern Asia are dotted tell us at that time of the year the tale of what mutual aid means for the birds; what force, energy, and protection it confers to every living being, however feeble and defenceless it otherwise might be. Take, for instance, one of the numberless lakes of the Russian and Siberian Steppes. Its shores are peopled with myriads of aquatic birds, belonging to at least a score of different species, all living in perfect peace-all protecting one another.

“For several hundred yards from the shore the air is filled with gulls and terns, as with snow-flakes on a winter day. Thousands of plovers and sand-courers run over the beach, searching their food, whistling, and simply enjoying life. Further on, on almost each wave, a duck is rocking, while higher up you notice the flocks of the Casarki ducks. Exuberant life swarms everywhere.”

And here are the robbers — the strongest, the most cunning ones, those “ideally organized for robbery.” And you hear their hungry, angry, dismal cries as for hours in succession they watch the opportunity of snatching from this mass of living beings one

single unprotected individual. But as soon as they approach, their presence is signalled by dozens of voluntary sentries, and hundreds of gulls and terns set to chase the robber. Maddened by hunger, the robber soon abandons his usual precautions: he suddenly dashes into the living mass; but, attacked from all sides, he again is compelled to retreat. From sheer despair he falls upon the wild ducks; but the intelligent, social birds rapidly gather in a flock and fly away if the robber is an erne; they plunge into the lake if it is a falcon; or they raise a cloud of water-dust and bewilder the assailant if it is a kite. And while life continues to swarm on the lake, the robber flies away with cries of anger, and looks out for carrion, or for a young bird or a field-mouse not yet used to obey in time the warnings of its comrades. In the face of an exuberant life, the ideally-armed robber must be satisfied with the off-fall of that life.

Further north, in the Arctic archipelagoes,

“you may sail along the coast for many miles and see all the ledges, all the cliffs and corners of the mountain-sides, up to a height of from two to five hundred feet, literally covered with sea-birds, whose white breasts show against the dark rocks as if the rocks were closely sprinkled with chalk specks. The air, near and far, is, so to say, full with fowls.”

Each of such “bird-mountains” is a living illustration of mutual aid, as well as of the infinite variety of characters, individual and specific, resulting from social life. The oyster-catcher is renowned for its readiness to attack the birds of prey. The barge is known for its watchfulness, and it easily becomes the leader of more placid birds. The turnstone, when surrounded by comrades belonging to more energetic species, is a rather

timorous bird; but it undertakes to keep watch for the security of the commonwealth when surrounded by smaller birds. Here you have the dominative swans; there, the extremely sociable kittiwake-gulls, among whom quarrels are rare and short; the prepossessing polar guillemots, which continually caress each other; the egoist she-goose, who has repudiated the orphans of a killed comrade; and, by her side, another female who adopts any one's orphans, and now paddles surrounded by fifty or sixty youngsters, whom she conducts and cares for as if they all were her own breed. Side by side with the penguins, which steal one another's eggs, you have the dotterels, whose family relations are so "charming and touching" that even passionate hunters recoil from shooting a female surrounded by her young ones; or the eider-ducks, among which (like the velvet-ducks, or the coroyas of the Savannahs) several females hatch together in the same nest or the lums, which sit in turn upon a common covey. Nature is variety itself, offering all possible varieties of characters, from the basest to the highest: and that is why she cannot be depicted by any sweeping assertion. Still less can she be judged from the moralist's point of view, because the views of the moralist are themselves a result — mostly unconscious — of the observation of Nature.

Coming together at nesting-time is so common with most birds that more examples are scarcely needed. Our trees are crowned with groups of crows' nests; our hedges are full of nests of smaller birds; our farmhouses give shelter to colonies of swallows; our old towers are the refuge of hundreds of nocturnal birds; and pages might be filled with the most charming descriptions of the peace and harmony which prevail in almost all these nesting associations. As to the protection derived by the weakest birds from their unions, it is evident. That excellent observer, Dr. Couës, saw, for instance, the little cliff-swallows nesting in the immediate neighbourhood of the prairie falcon (*Falco polyargus*). The falcon had its nest on the top of one of the minarets of clay which are so

common in the cañons of Colorado, while a colony of swallows nested just beneath. The little peaceful birds had no fear of their rapacious neighbour; they never let it approach to their colony. They immediately surrounded it and chased it, so that it had to make off at once.

Life in societies does not cease when the nesting period is over; it begins then in a new form. The young broods gather in societies of youngsters, generally including several species. Social life is practised at that time chiefly for its own sake — partly for security, but chiefly for the pleasures derived from it. So we see in our forests the societies formed by the young nuthatchers (*Sitta cæsia*), together with tit-mouses, chaffinches, wrens, tree-creepers, or some wood-peckers. In Spain the swallow is met with in company with kestrels, fly-catchers, and even pigeons. In the Far West of America the young horned larks live in large societies, together with another lark (Sprague's), the skylark, the Savannah sparrow, and several species of buntings and longspurs. In fact, it would be much easier to describe the species which live isolated than to simply name those species which join the autumnal societies of young birds — not for hunting or nesting purposes, but simply to enjoy life in society and to spend their time in plays and sports, after having given a few hours every day to find their daily food.

And, finally, we have that immense display of mutual aid among birds-their migrations — which I dare not even enter upon in this place. Sufficient to say that birds which have lived for months in small bands scattered over a wide territory gather in thousands; they come together at a given place, for several days in succession, before they start, and they evidently discuss the particulars of the journey. Some species will indulge every afternoon in flights preparatory to the long passage. All wait for their tardy congeners,

and finally they start in a certain well chosen direction — a fruit of accumulated collective experience — the strongest flying at the head of the band, and relieving one another in that difficult task. They cross the seas in large bands consisting of both big and small birds, and when they return next spring they repair to the same spot, and, in most cases, each of them takes possession of the very same nest which it had built or repaired the previous year.

This subject is so vast, and yet so imperfectly studied; it offers so many striking illustrations of mutual-aid habits, subsidiary to the main fact of migration — each of which would, however, require a special study — that I must refrain from entering here into more details. I can only cursorily refer to the numerous and animated gatherings of birds which take place, always on the same spot, before they begin their long journeys north or south, as also those which one sees in the north, after the birds have arrived at their breeding-places on the Yenisei or in the northern counties of England. For many days in succession — sometimes one month — they will come together every morning for one hour, before flying in search of food — perhaps discussing the spot where they are going to build their nests. And if, during the migration, their columns are overtaken by a storm, birds of the most different species will be brought together by common misfortune. The birds which are not exactly migratory, but slowly move northwards and southwards with the seasons, also perform these peregrinations in flocks. So far from migrating isolately, in order to secure for each separate individual the advantages of better food or shelter which are to be found in another district — they always wait for each other, and gather in flocks, before they move north or south, in accordance with the season.

Going now over to mammals, the first thing which strikes us is the overwhelming numerical predominance of social species over those few carnivores which do not associate. The plateaus, the Alpine tracts, and the Steppes of the Old and New World are stocked with herds of deer, antelopes, gazelles, fallow deer, buffaloes, wild goats and sheep, all of which are sociable animals. When the Europeans came to settle in America, they found it so densely peopled with buffaloes, that pioneers had to stop their advance when a column of migrating buffaloes came to cross the route they followed; the march past of the dense column lasting sometimes for two and three days. And when the Russians took possession of Siberia they found it so densely peopled with deer, antelopes, squirrels, and other sociable animals, that the very conquest of Siberia was nothing but a hunting expedition which lasted for two hundred years; while the grass plains of Eastern Africa are still covered with herds composed of zebra, the hartebeest, and other antelopes.

Not long ago the small streams of Northern America and Northern Siberia were peopled with colonies of beavers, and up to the seventeenth century like colonies swarmed in Northern Russia. The flat lands of the four great continents are still covered with countless colonies of mice, ground-squirrels, marmots, and other rodents. In the lower latitudes of Asia and Africa the forests are still the abode of numerous families of elephants, rhinoceroses, and numberless societies of monkeys. In the far north the reindeer aggregate in numberless herds; while still further north we find the herds of the musk-oxen and numberless bands of polar foxes. The coasts of the ocean are enlivened by flocks of seals and morses; its waters, by shoals of sociable cetaceans; and even in the depths of the great plateau of Central Asia we find herds of wild horses, wild donkeys, wild camels, and wild sheep. All these mammals live in societies and nations sometimes numbering hundreds of thousands of individuals, although now, after three

centuries of gunpowder civilization, we find but the débris of the immense aggregations of old. How trifling, in comparison with them, are the numbers of the carnivores! And how false, therefore, is the view of those who speak of the animal world as if nothing were to be seen in it but lions and hyenas plunging their bleeding teeth into the flesh of their victims! One might as well imagine that the whole of human life is nothing but a succession of war massacres.

Association and mutual aid are the rule with mammals. We find social habits even among the carnivores, and we can only name the cat tribe (lions, tigers, leopards, etc.) as a division the members of which decidedly prefer isolation to society, and are but seldom met with even in small groups. And yet, even among lions “this is a very common practice to hunt in company.” The two tribes of the civets (*Viverridæ*) and the weasels (*Mustelidæ*) might also be characterized by their isolated life, but it is a fact that during the last century the common weasel was more sociable than it is now; it was seen then in larger groups in Scotland and in the Unterwalden canton of Switzerland. As to the great tribe of the dogs, it is eminently sociable, and association for hunting purposes may be considered as eminently characteristic of its numerous species. It is well known, in fact, that wolves gather in packs for hunting, and Tschudi left an excellent description of how they draw up in a half-circle, surround a cow which is grazing on a mountain slope, and then, suddenly appearing with a loud barking, make it roll in the abyss. Audubon, in the thirties, also saw the Labrador wolves hunting in packs, and one pack following a man to his cabin, and killing the dogs. During severe winters the packs of wolves grow so numerous as to become a danger for human settlements, as was the case in France some five-and-forty years ago. In the Russian Steppes they never attack the horses otherwise than in packs; and yet they have to sustain bitter fights, during which the horses (according to Kohl’s testimony) sometimes assume offensive warfare, and in

such cases, if the wolves do not retreat promptly, they run the risk of being surrounded by the horses and killed by their hoofs. The prairie-wolves (*Canis latrans*) are known to associate in bands of from twenty to thirty individuals when they chase a buffalo occasionally separated from its herd. Jackals, which are most courageous and may be considered as one of the most intelligent representatives of the dog tribe, always hunt in packs; thus united, they have no fear of the bigger carnivores. As to the wild dogs of Asia (the Kholzuns, or Dholes), Williamson saw their large packs attacking all larger animals save elephants and rhinoceroses, and overpowering bears and tigers. Hyenas always live in societies and hunt in packs, and the hunting organizations of the painted lycaons are highly praised by Cumming. Nay, even foxes, which, as a rule, live isolated in our civilized countries, have been seen combining for hunting purposes. As to the polar fox, it is — or rather was in Steller's time — one of the most sociable animals; and when one reads Steller's description of the war that was waged by Behring's unfortunate crew against these intelligent small animals, one does not know what to wonder at most: the extraordinary intelligence of the foxes and the mutual aid they displayed in digging out food concealed under cairns, or stored upon a pillar (one fox would climb on its top and throw the food to its comrades beneath), or the cruelty of man, driven to despair by the numerous packs of foxes. Even some bears live in societies where they are not disturbed by man. Thus Steller saw the black bear of Kamtchatka in numerous packs, and the polar bears are occasionally found in small groups. Even the unintelligent insectivores do not always disdain association.

However, it is especially with the rodents, the ungulata, and the ruminants that we find a highly developed practice of mutual aid. The squirrels are individualist to a great extent. Each of them builds its own comfortable nest, and accumulates its own provision. Their inclinations are towards family life, and Brehm found that a family of squirrels is never

so happy as when the two broods of the same year can join together with their parents in a remote corner of a forest. And yet they maintain social relations. The inhabitants of the separate nests remain in a close intercourse, and when the pine-cones become rare in the forest they inhabit, they emigrate in bands. As to the black squirrels of the Far West, they are eminently sociable. Apart from the few hours given every day to foraging, they spend their lives in playing in numerous parties. And when they multiply too rapidly in a region, they assemble in bands, almost as numerous as those of locusts, and move southwards, devastating the forests, the fields, and the gardens; while foxes, polecats, falcons, and nocturnal birds of prey follow their thick columns and live upon the individuals remaining behind. The ground-squirrel — a closely-akin genus — is still more sociable. It is given to hoarding, and stores up in its subterranean halls large amounts of edible roots and nuts, usually plundered by man in the autumn. According to some observers, it must know something of the joys of a miser. And yet it remains sociable. It always lives in large villages, and Audubon, who opened some dwellings of the hackee in the winter, found several individuals in the same apartment; they must have stored it with common efforts.

The large tribe, of the marmots, which includes the three large genres of *Arctomys*, *Cynomys*, and *Spermophilus*, is still more sociable and still more intelligent. They also prefer having each one its own dwelling; but they live in big villages. That terrible enemy of the crops of South Russia — the souslik — of which some ten millions are exterminated every year by man alone, lives in numberless colonies; and while the Russian provincial assemblies gravely discuss the means of getting rid of this enemy of society, it enjoys life in its thousands in the most joyful way. Their play is so charming that no observer could refrain from paying them a tribute of praise, and from mentioning the melodious concerts arising from the sharp whistlings of the males and the

melancholic whistlings of the females, before — suddenly returning to his citizen's duties — he begins inventing the most diabolic means for the extermination of the little robbers. All kinds of rapacious birds and beasts of prey having proved powerless, the last word of science in this warfare is the inoculation of cholera! The villages of the prairie-dogs in America are one of the loveliest sights. As far as the eye can embrace the prairie, it sees heaps of earth, and on each of them a prairie-dog stands, engaged in a lively conversation with its neighbours by means of short barkings. As soon as the approach of man is signalled, all plunge in a moment into their dwellings; all have disappeared as by enchantment. But if the danger is over, the little creatures soon reappear. Whole families come out of their galleries and indulge in play. The young ones scratch one another, they worry one another, and display their gracefulness while standing upright, and in the meantime the old ones keep watch. They go visiting one another, and the beaten footpaths which connect all their heaps testify to the frequency of the visitations. In short, the best naturalists have written some of their best pages in describing the associations of the prairie-dogs of America, the marmots of the Old World, and the polar marmots of the Alpine regions. And yet, I must make, as regards the marmots, the same remark as I have made when speaking of the bees. They have maintained their fighting instincts, and these instincts reappear in captivity. But in their big associations, in the face of free Nature, the unsociable instincts have no opportunity to develop, and the general result is peace and harmony.

Even such harsh animals as the rats, which continually fight in our cellars, are sufficiently intelligent not to quarrel when they plunder our larders, but to aid one another in their plundering expeditions and migrations, and even to feed their invalids. As to the beaver-rats or musk-rats of Canada, they are extremely sociable. Audubon could not but admire “their peaceful communities, which require only being left in peace

to enjoy happiness.” Like all sociable animals, they are lively and playful, they easily combine with other species, and they have attained a very high degree of intellectual development. In their villages, always disposed on the shores of lakes and rivers, they take into account the changing level of water; their domeshaped houses, which are built of beaten clay interwoven with reeds, have separate corners for organic refuse, and their halls are well carpeted at winter time; they are warm, and, nevertheless, well ventilated. As to the beavers, which are endowed, as known, with a most sympathetic character, their astounding dams and villages, in which generations live and die without knowing of any enemies but the otter and man, so wonderfully illustrate what mutual aid can achieve for the security of the species, the development of social habits, and the evolution of intelligence, that they are familiar to all interested in animal life. Let me only remark that with the beavers, the muskrats, and some other rodents, we already find the feature which will also be distinctive of human communities — that is, work in common.

I pass in silence the two large families which include the jerboa, the chinchilla, the biscacha, and the tushkan, or underground hare of South Russia, though all these small rodents might be taken as excellent illustrations of the pleasures derived by animals from social life. Precisely, the pleasures; because it is extremely difficult to say what brings animals together — the needs of mutual protection, or simply the pleasure of feeling surrounded by their congeners. At any rate, our common hares, which do not gather in societies for life in common, and which are not even endowed with intense parental feelings, cannot live without coming together for play. Dietrich de Winckell, who is considered to be among the best acquainted with the habits of hares, describes them as passionate players, becoming so intoxicated by their play that a hare has been known to take an approaching fox for a playmate. As to the rabbit, it lives in societies,

and its family life is entirely built upon the image of the old patriarchal family; the young ones being kept in absolute obedience to the father and even the grandfather. And here we have the example of two very closely-allied species which cannot bear each other — not because they live upon nearly the same food, as like cases are too often explained, but most probably because the passionate, eminently-individualist hare cannot make friends with that placid, quiet, and submissive creature, the rabbit. Their tempers are too widely different not to be an obstacle to friendship.

Life in societies is again the rule with the large family of horses, which includes the wild horses and donkeys of Asia, the zebras, the mustangs, the cimarrones of the Pampas, and the half-wild horses of Mongolia and Siberia. They all live in numerous associations made up of many studs, each of which consists of a number of mares under the leadership of a male. These numberless inhabitants of the Old and the New World, badly organized on the whole for resisting both their numerous enemies and the adverse conditions of climate, would soon have disappeared from the surface of the earth were it not for their sociable spirit. When a beast of prey approaches them, several studs unite at once; they repulse the beast and sometimes chase it: and neither the wolf nor the bear, not even the lion, can capture a horse or even a zebra as long as they are not detached from the herd. When a drought is burning the grass in the prairies, they gather in herds of sometimes 10,000 individuals strong, and migrate. And when a snow-storm rages in the Steppes, each stud keeps close together, and repairs to a protected ravine. But if confidence disappears, or the group has been seized by panic, and disperses, the horses perish and the survivors are found after the storm half dying from fatigue. Union is their chief arm in the struggle for life, and man is their chief enemy. Before his increasing numbers the ancestors of our domestic horse (the *Equus Przewalskii*, so named by Polyakoff) have preferred to retire to the wildest and least accessible plateaus on the

outskirts of Thibet, where they continue to live, surrounded by carnivores, under a climate as bad as that of the Arctic regions, but in a region inaccessible to man.

Many striking illustrations of social life could be taken from the life of the reindeer, and especially of that large division of ruminants which might include the roebucks, the fallow deer, the antelopes, the gazelles, the ibex, and, in fact, the whole of the three numerous families of the Antelopides, the Caprides, and the Ovides. Their watchfulness over the safety of their herds against attacks of carnivores; the anxiety displayed by all individuals in a herd of chamois as long as all of them have not cleared a difficult passage over rocky cliffs; the adoption of orphans; the despair of the gazelle whose mate, or even comrade of the same sex, has been killed; the plays of the youngsters, and many other features, could be mentioned. But perhaps the most striking illustration of mutual support is given by the occasional migrations of fallow deer, such as I saw once on the Amur. When I crossed the high plateau and its border ridge, the Great Khingan, on my way from Transbaikalia to Merghen, and further travelled over the high prairies on my way to the Amur, I could ascertain how thinly-peopled with fallow deer these mostly uninhabited regions are. Two years later I was travelling up the Amur, and by the end of October reached the lower end of that picturesque gorge which the Amur pierces in the Dousse-alin (Little Khingan) before it enters the lowlands where it joins the Sungari. I found the Cossacks in the villages of that gorge in the greatest excitement, because thousands and thousands of fallow deer were crossing the Amur where it is narrowest, in order to reach the lowlands. For several days in succession, upon a length of some forty miles up the river, the Cossacks were butchering the deer as they crossed the Amur, in which already floated a good deal of ice. Thousands were killed every day, and the exodus nevertheless continued. Like migrations were never seen either before or since, and this one must have been called for by an early and heavy snow-fall in the

Great Khingan, which compelled the deer to make a desperate attempt at reaching the lowlands in the east of the Dousse mountains. Indeed, a few days later the Dousse-alin was also buried under snow two or three feet deep. Now, when one imagines the immense territory (almost as big as Great Britain) from which the scattered groups of deer must have gathered for a migration which was undertaken under the pressure of exceptional circumstances, and realizes the difficulties which had to be overcome before all the deer came to the common idea of crossing the Amur further south, where it is narrowest, one cannot but deeply admire the amount of sociability displayed by these intelligent animals. The fact is not the less striking if we remember that the buffaloes of North America displayed the same powers of combination. One saw them grazing in great numbers in the plains, but these numbers were made up by an infinity of small groups which never mixed together. And yet, when necessity arose, all groups, however scattered over an immense territory, came together and made up those immense columns, numbering hundreds of thousands of individuals, which I mentioned on a preceding page.

I also ought to say a few words at least about the “compound families” of the elephants, their mutual attachment, their deliberate ways in posting sentries, and the feelings of sympathy developed by such a life of close mutual support. I might mention the sociable feelings of those disreputable creatures the wild boars, and find a word of praise for their powers of association in the case of an attack by a beast of prey. The hippopotamus and the rhinoceros, too, would occupy a place in a work devoted to animal sociability. Several striking pages might be given to the sociability and mutual attachment of the seals and the walruses; and finally, one might mention the most excellent feelings existing among the sociable cetaceans. But I have to say yet a few words about the

societies of monkeys, which acquire an additional interest from their being the link which will bring us to the societies of primitive men.

It is hardly needful to say that those mammals, which stand at the very top of the animal world and most approach man by their structure and intelligence, are eminently sociable. Evidently we must be prepared to meet with all varieties of character and habits in so great a division of the animal kingdom which includes hundreds of species. But, all things considered, it must be said that sociability, action in common, mutual protection, and a high development of those feelings which are the necessary outcome of social life, are characteristic of most monkeys and apes. From the smallest species to the biggest ones, sociability is a rule to which we know but a few exceptions. The nocturnal apes prefer isolated life; the capuchins (*Cebus capucinus*), the monos, and the howling monkeys live but in small families; and the orang-outans have never been seen by A.R. Wallace otherwise than either solitary or in very small groups of three or four individuals, while the gorillas seem never to join in bands. But all the remainder of the monkey tribe — the chimpanzees, the sajous, the sakis, the mandrills, the baboons, and so on — are sociable in the highest degree. They live in great bands, and even join with other species than their own. Most of them become quite unhappy when solitary. The cries of distress of each one of the band immediately bring together the whole of the band, and they boldly repulse the attacks of most carnivores and birds of prey. Even eagles do not dare attack them. They plunder our fields always in bands — the old ones taking care for the safety of the commonwealth. The little tee-tees, whose childish sweet faces so much struck Humboldt, embrace and protect one another when it rains, rolling their tails over the necks of their shivering comrades. Several species display the greatest solicitude for their wounded, and do not abandon a wounded comrade during a retreat till they have ascertained that it is dead and that they are helpless to restore it to life.

Thus James Forbes narrated in his *Oriental Memoirs* a fact of such resistance in reclaiming from his hunting party the dead body of a female monkey that one fully understands why “the witnesses of this extraordinary scene resolved never again to fire at one of the monkey race.” In some species several individuals will combine to overturn a stone in order to search for ants’ eggs under it. The hamadryas not only post sentries, but have been seen making a chain for the transmission of the spoil to a safe place; and their courage is well known. Brehm’s description of the regular fight which his caravan had to sustain before the hamadryas would let it resume its journey in the valley of the Mensa, in Abyssinia, has become classical. The playfulness of the tailed apes and the mutual attachment which reigns in the families of chimpanzees also are familiar to the general reader. And if we find among the highest apes two species, the orang-outan and the gorilla, which are not sociable, we must remember that both — limited as they are to very small areas, the one in the heart of Africa, and the other in the two islands of Borneo and Sumatra have all the appearance of being the last remnants of formerly much more numerous species. The gorilla at least seems to have been sociable in olden times, if the apes mentioned in the *Periplus* really were gorillas.

We thus see, even from the above brief review, that life in societies is no exception in the animal world; it is the rule, the law of Nature, and it reaches its fullest development with the higher vertebrates. Those species which live solitary, or in small families only, are relatively few, and their numbers are limited. Nay, it appears very probable that, apart from a few exceptions, those birds and mammals which are not gregarious now, were living in societies before man multiplied on the earth and waged a permanent war against them, or destroyed the sources from which they formerly derived food. “On ne s’associe pas pour mourir,” [We do not associate to die] was the sound remark of

Espinas; and Houzeau, who knew the animal world of some parts of America when it was not yet affected by man, wrote to the same effect.

Association is found in the animal world at all degrees of evolution; and, according to the grand idea of Herbert Spencer, so brilliantly developed in Perrier's *Colonies Animales*, colonies are at the very origin of evolution in the animal kingdom. But, in proportion as we ascend the scale of evolution, we see association growing more and more conscious. It loses its purely physical character, it ceases to be simply instinctive, it becomes reasoned. With the higher vertebrates it is periodical, or is resorted to for the satisfaction of a given want — propagation of the species, migration, hunting, or mutual defence. It even becomes occasional, when birds associate against a robber, or mammals combine, under the pressure of exceptional circumstances, to emigrate. In this last case, it becomes a voluntary deviation from habitual moods of life. The combination sometimes appears in two or more degrees — the family first, then the group, and finally the association of groups, habitually scattered, but uniting in case of need, as we saw it with the bisons and other ruminants. It also takes higher forms, guaranteeing more independence to the individual without depriving it of the benefits of social life. With most rodents the individual has its own dwelling, which it can retire to when it prefers being left alone; but the dwellings are laid out in villages and cities, so as to guarantee to all inhabitants the benefits and joys of social life. And finally, in several species, such as rats, marmots, hares, etc., sociable life is maintained notwithstanding the quarrelsome or otherwise egotistic inclinations of the isolated individual. Thus it is not imposed, as is the case with ants and bees, by the very physiological structure of the individuals; it is cultivated for the benefits of mutual aid, or for the sake of its pleasures. And this, of course, appears with all possible gradations and with the greatest variety of individual

and specific characters — the very variety of aspects taken by social life being a consequence, and for us a further proof, of its generality.

Sociability — that is, the need of the animal of associating with its like — the love of society for society's sake, combined with the “joy of life,” only now begins to receive due attention from the zoologists. We know at the present time that all animals, beginning with the ants, going on to the birds, and ending with the highest mammals, are fond of plays, wrestling, running after each other, trying to capture each other, teasing each other, and so on. And while many plays are, so to speak, a school for the proper behaviour of the young in mature life, there are others, which, apart from their utilitarian purposes, are, together with dancing and singing, mere manifestations of an excess of forces — “the joy of life,” and a desire to communicate in some way or another with other individuals of the same or of other species — in short, a manifestation of sociability proper, which is a distinctive feature of all the animal world. Whether the feeling be fear, experienced at the appearance of a bird of prey, or “a fit of gladness” which bursts out when the animals are in good health and especially when young, or merely the desire of giving play to an excess of impressions and of vital power — the necessity of communicating impressions, of playing, of chattering, or of simply feeling the proximity of other kindred living beings pervades Nature, and is, as much as any other physiological function, a distinctive feature of life and impressionability. This need takes a higher development and attains a more beautiful expression in mammals, especially amidst their young, and still more among the birds; but it pervades all Nature, and has been fully observed by the best naturalists, including Pierre Huber, even amongst the ants, and it is evidently the same instinct which brings together the big columns of butterflies which have been referred to already.

The habit of coming together for dancing and of decorating the places where the birds habitually perform their dances is, of course, well known from the pages that Darwin gave to this subject in *The Descent of Man* (ch. xiii). Visitors of the London Zoological Gardens also know the bower of the satin bower-bird. But this habit of dancing seems to be much more widely spread than was formerly believed, and Mr. W. Hudson gives in his master-work on *La Plata* the most interesting description, which must be read in the original, of complicated dances, performed by quite a number of birds: rails, jacanas, lapwings, and so on.

The habit of singing in concert, which exists in several species of birds, belongs to the same category of social instincts. It is most strikingly developed with the chakar (*Chauna chavarría*), to which the English have given the most unimaginative misnomer of “crested screamer.” These birds sometimes assemble in immense flocks, and in such cases they frequently sing all in concert. W.H. Hudson found them once in countless numbers, ranged all round a pampas lake in well-defined flocks, of about 500 birds in each flock.

“Presently,” he writes, “one flock near me began singing, and continued their powerful chant for three or four minutes; when they ceased the next flock took up the strains, and after it the next, and so on, until once more the notes of the flocks on the opposite shore came floating strong and clear across the water — then passed away, growing fainter and fainter, until once more the sound approached me travelling round to my side again.”

On another occasion the same writer saw a whole plain covered with an endless flock of chakars, not in close order, but scattered in pairs and small groups. About nine o'clock in the evening, "suddenly the entire multitude of birds covering the marsh for miles around burst forth in a tremendous evening song.... It was a concert well worth riding a hundred miles to hear." It may be added that like all sociable animals, the chakar easily becomes tame and grows very attached to man. "They are mild-tempered birds, and very rarely quarrel" — we are told — although they are well provided with formidable weapons. Life in societies renders these weapons useless.

That life in societies is the most powerful weapon in the struggle for life, taken in its widest sense, has been illustrated by several examples on the foregoing pages, and could be illustrated by any amount of evidence, if further evidence were required. Life in societies enables the feeblest insects, the feeblest birds, and the feeblest mammals to resist, or to protect themselves from, the most terrible birds and beasts of prey; it permits longevity; it enables the species to rear its progeny with the least waste of energy and to maintain its numbers albeit a very slow birth-rate; it enables the gregarious animals to migrate in search of new abodes. Therefore, while fully admitting that force, swiftness, protective colours, cunningness, and endurance to hunger and cold, which are mentioned by Darwin and Wallace, are so many qualities making the individual, or the species, the fittest under certain circumstances, we maintain that under any circumstances sociability is the greatest advantage in the struggle for life. Those species which willingly or unwillingly abandon it are doomed to decay; while those animals which know best how to combine, have the greatest chances of survival and of further evolution, although they may be inferior to others in each of the faculties enumerated by Darwin and Wallace, save the intellectual faculty. The highest vertebrates, and especially mankind, are the best proof of this assertion. As to the intellectual faculty, while every Darwinist will

agree with Darwin that it is the most powerful arm in the struggle for life, and the most powerful factor of further evolution, he also will admit that intelligence is an eminently social faculty. Language, imitation, and accumulated experience are so many elements of growing intelligence of which the unsociable animal is deprived. Therefore we find, at the top of each class of animals, the ants, the parrots, and the monkeys, all combining the greatest sociability with the highest development of intelligence. The fittest are thus the most sociable animals, and sociability appears as the chief factor of evolution, both directly, by securing the well-being of the species while diminishing the waste of energy, and indirectly, by favouring the growth of intelligence.

Moreover, it is evident that life in societies would be utterly impossible without a corresponding development of social feelings, and, especially, of a certain collective sense of justice growing to become a habit. If every individual were constantly abusing its personal advantages without the others interfering in favour of the wronged, no society — life would be possible. And feelings of justice develop, more or less, with all gregarious animals. Whatever the distance from which the swallows or the cranes come, each one returns to the nest it has built or repaired last year. If a lazy sparrow intends appropriating the nest which a comrade is building, or even steals from it a few sprays of straw, the group interferes against the lazy comrade; and it is evident that without such interference being the rule, no nesting associations of birds could exist. Separate groups of penguins have separate resting-places and separate fishing abodes, and do not fight for them. The droves of cattle in Australia have particular spots to which each group repairs to rest, and from which it never deviates; and so on. We have any numbers of direct observations of the peace that prevails in the nesting associations of birds, the villages of the rodents, and the herds of grass-eaters; while, on the other side, we know of few sociable animals which so continually quarrel as the rats in our cellars do, or as

the morses, which fight for the possession of a sunny place on the shore. Sociability thus puts a limit to physical struggle, and leaves room for the development of better moral feelings. The high development of parental love in all classes of animals, even with lions and tigers, is generally known. As to the young birds and mammals whom we continually see associating, sympathy — not love — attains a further development in their associations. Leaving aside the really touching facts of mutual attachment and compassion which have been recorded as regards domesticated animals and with animals kept in captivity, we have a number of well certified facts of compassion between wild animals at liberty. Max Perty and L. Büchner have given a number of such facts. J.C. Wood's narrative of a weasel which came to pick up and to carry away an injured comrade enjoys a well-merited popularity. So also the observation of Captain Stansbury on his journey to Utah which is quoted by Darwin; he saw a blind pelican which was fed, and well fed, by other pelicans upon fishes which had to be brought from a distance of thirty miles. And when a herd of vicunas was hotly pursued by hunters, H.A. Weddell saw more than once during his journey to Bolivia and Peru, the strong males covering the retreat of the herd and lagging behind in order to protect the retreat. As to facts of compassion with wounded comrades, they are continually mentioned by all field zoologists. Such facts are quite natural. Compassion is a necessary outcome of social life. But compassion also means a considerable advance in general intelligence and sensibility. It is the first step towards the development of higher moral sentiments. It is, in its turn, a powerful factor of further evolution.

If the views developed on the preceding pages are correct, the question necessarily arises, in how far are they consistent with the theory of struggle for life as it has been developed by Darwin, Wallace, and their followers? and I will now briefly answer this important question. First of all, no naturalist will doubt that the idea of a struggle for life

carried on through organic nature is the greatest generalization of our century. Life is struggle; and in that struggle the fittest survive. But the answers to the questions, “By which arms is this struggle chiefly carried on?” and “Who are the fittest in the struggle?” will widely differ according to the importance given to the two different aspects of the struggle: the direct one, for food and safety among separate individuals, and the struggle which Darwin described as “metaphorical” — the struggle, very often collective, against adverse circumstances. No one will deny that there is, within each species, a certain amount of real competition for food — at least, at certain periods. But the question is, whether competition is carried on to the extent admitted by Darwin, or even by Wallace; and whether this competition has played, in the evolution of the animal kingdom, the part assigned to it.

The idea which permeates Darwin’s work is certainly one of real competition going on within each animal group for food, safety, and possibility of leaving an offspring. He often speaks of regions being stocked with animal life to their full capacity, and from that overstocking he infers the necessity of competition. But when we look in his work for real proofs of that competition, we must confess that we do not find them sufficiently convincing. If we refer to the paragraph entitled “Struggle for Life most severe between Individuals and Varieties of the same Species,” we find in it none of that wealth of proofs and illustrations which we are accustomed to find in whatever Darwin wrote. The struggle between individuals of the same species is not illustrated under that heading by even one single instance: it is taken as granted; and the competition between closely-allied animal species is illustrated by but five examples, out of which one, at least (relating to the two species of thrushes), now proves to be doubtful. But when we look for more details in order to ascertain how far the decrease of one species was really occasioned by the increase of the other species, Darwin, with his usual fairness, tells us:

“We can dimly see why the competition should be most severe between allied forms which fill nearly the same place in nature; but probably in no case could we precisely say why one species has been victorious over another in the great battle of life.”

As to Wallace, who quotes the same facts under a slightly-modified heading (“Struggle for Life between closely-allied Animals and Plants often most severe”), he makes the following remark (*italics are mine*), which gives quite another aspect to the facts above quoted. He says:

“In some cases, no doubt, there is actual war between the two, the stronger killing the weaker; but this is by no means necessary, and there may be cases in which the weaker species, physically, may prevail by its power of more rapid multiplication, its better withstanding vicissitudes of climate, or its greater cunning in escaping the attacks of common enemies.”

In such cases what is described as competition may be no competition at all. One species succumbs, not because it is exterminated or starved out by the other species, but because it does not well accommodate itself to new conditions, which the other does. The term “struggle for life” is again used in its metaphorical sense, and may have no other. As to the real competition between individuals of the same species, which is illustrated in another place by the cattle of South America during a period of drought, its value is impaired by its being taken from among domesticated animals. Bisons emigrate in like circumstances in order to avoid competition. However severe the struggle between

plants — and this is amply proved — we cannot but repeat Wallace’s remark to the effect that “plants live where they can,” while animals have, to a great extent, the power of choice of their abode. So that we again are asking ourselves, To what extent does competition really exist within each animal species? Upon what is the assumption based?

The same remark must be made concerning the indirect argument in favour of a severe competition and struggle for life within each species, which may be derived from the “extermination of transitional varieties,” so often mentioned by Darwin. It is known that for a long time Darwin was worried by the difficulty which he saw in the absence of a long chain of intermediate forms between closely-allied species, and that he found the solution of this difficulty in the supposed extermination of the intermediate forms. However, an attentive reading of the different chapters in which Darwin and Wallace speak of this subject soon brings one to the conclusion that the word “extermination” does not mean real extermination; the same remark which Darwin made concerning his expression: “struggle for existence,” evidently applies to the word “extermination” as well. It can by no means be understood in its direct sense, but must be taken “in its metaphoric sense.”

If we start from the supposition that a given area is stocked with animals to its fullest capacity, and that a keen competition for the sheer means of existence is consequently going on between all the inhabitants — each animal being compelled to fight against all its congeners in order to get its daily food — then the appearance of a new and successful variety would certainly mean in many cases (though not always) the appearance of individuals which are enabled to seize more than their fair share of the

means of existence; and the result would be that those individuals would starve both the parental form which does not possess the new variation and the intermediate forms which do not possess it in the same degree. It may be that at the outset, Darwin understood the appearance of new varieties under this aspect; at least, the frequent use of the word “extermination” conveys such an impression. But both he and Wallace knew Nature too well not to perceive that this is by no means the only possible and necessary course of affairs.

If the physical and the biological conditions of a given area, the extension of the area occupied by a given species, and the habits of all the members of the latter remained unchanged — then the sudden appearance of a new variety might mean the starving out and the extermination of all the individuals which were not endowed in a sufficient degree with the new feature by which the new variety is characterized. But such a combination of conditions is precisely what we do not see in Nature. Each species is continually tending to enlarge its abode; migration to new abodes is the rule with the slow snail, as with the swift bird; physical changes are continually going on in every given area; and new varieties among animals consist in an immense number of cases -- perhaps in the majority — not in the growth of new weapons for snatching the food from the mouth of its congeners — food is only one out of a hundred of various conditions of existence — but, as Wallace himself shows in a charming paragraph on the “divergence of characters” (*Darwinism*, p. 107), in forming new habits, moving to new abodes, and taking to new sorts of food. In all such cases there will be no extermination, even no competition — the new adaptation being a relief from competition, if it ever existed; and yet there will be, after a time, an absence of intermediate links, in consequence of a mere survival of those which are best fitted for the new conditions — as surely as under the hypothesis of extermination of the parental form. It hardly need be added that if we

admit, with Spencer, all the Lamarckians, and Darwin himself, the modifying influence of the surroundings upon the species, there remains still less necessity for the extermination of the intermediate forms.

The importance of migration and of the consequent isolation of groups of animals, for the origin of new varieties and ultimately of new species, which was indicated by Moritz Wagner, was fully recognized by Darwin himself. Consequent researches have only accentuated the importance of this factor, and they have shown how the largeness of the area occupied by a given species — which Darwin considered with full reason so important for the appearance of new varieties — can be combined with the isolation of parts of the species, in consequence of local geological changes, or of local barriers. It would be impossible to enter here into the discussion of this wide question, but a few remarks will do to illustrate the combined action of these agencies. It is known that portions of a given species will often take to a new sort of food. The squirrels, for instance, when there is a scarcity of cones in the larch forests, remove to the fir-tree forests, and this change of food has certain well-known physiological effects on the squirrels. If this change of habits does not last — if next year the cones are again plentiful in the dark larch woods — no new variety of squirrels will evidently arise from this cause. But if part of the wide area occupied by the squirrels begins to have its physical characters altered — in consequence of, let us say, a milder climate or desiccation, which both bring about an increase of the pine forests in proportion to the larch woods — and if some other conditions concur to induce the squirrels to dwell on the outskirts of the desiccating region — we shall have then a new variety, i.e. an incipient new species of squirrels, without there having been anything that would deserve the name of extermination among the squirrels. A larger proportion of squirrels of the new, better adapted variety would survive every year, and the intermediate links

would die in the course of time, without having been starved out by Malthusian competitors. This is exactly what we see going on during the great physical changes which are accomplished over large areas in Central Asia, owing to the desiccation which is going on there since the glacial period.

To take another example, it has been proved by geologists that the present wild horse (*Equus Przewalski*) has slowly been evolved during the later parts of the Tertiary and the Quaternary period, but that during this succession of ages its ancestors were not confined to some given, limited area of the globe. They wandered over both the Old and New World, returning, in all probability, after a time to the pastures which they had, in the course of their migrations, formerly left. Consequently, if we do not find now, in Asia, all the intermediate links between the present wild horse and its Asiatic Post-Tertiary ancestors, this does not mean at all that the intermediate links have been exterminated. No such extermination has ever taken place. No exceptional mortality may even have occurred among the ancestral species: the individuals which belonged to intermediate varieties and species have died in the usual course of events — often amidst plentiful food, and their remains were buried all over the globe.

In short, if we carefully consider this matter, and, carefully re-read what Darwin himself wrote upon this subject, we see that if the word “extermination” be used at all in connection with transitional varieties, it must be used in its metaphoric sense. As to “competition,” this expression, too, is continually used by Darwin (see, for instance, the paragraph “On Extinction”) as an image, or as a way-of-speaking, rather than with the intention of conveying the idea of a real competition between two portions of the same

species for the means of existence. At any rate, the absence of intermediate forms is no argument in favour of it.

In reality, the chief argument in favour of a keen competition for the means of existence continually going on within every animal species is — to use Professor Geddes' expression — the “arithmetical argument” borrowed from Malthus.

But this argument does not prove it at all. We might as well take a number of villages in South-East Russia, the inhabitants of which enjoy plenty of food, but have no sanitary accommodation of any kind; and seeing that for the last eighty years the birth-rate was sixty in the thousand, while the population is now what it was eighty years ago, we might conclude that there has been a terrible competition between the inhabitants. But the truth is that from year to year the population remained stationary, for the simple reason that one-third of the new-born died before reaching their sixth month of life; one-half died within the next four years, and out of each hundred born, only seventeen or so reached the age of twenty. The new-comers went away before having grown to be competitors. It is evident that if such is the case with men, it is still more the case with animals. In the feathered world the destruction of the eggs goes on on such a tremendous scale that eggs are the chief food of several species in the early summer; not to, say a word of the storms, the inundations which destroy nests by the million in America, and the sudden changes of weather which are fatal to the young mammals. Each storm, each inundation, each visit of a rat to a bird's nest, each sudden change of temperature, take away those competitors which appear so terrible in theory.

As to the facts of an extremely rapid increase of horses and cattle in America, of pigs and rabbits in New Zealand, and even of wild animals imported from Europe (where their numbers are kept down by man, not by competition), they rather seem opposed to the theory of over-population. If horses and cattle could so rapidly multiply in America, it simply proved that, however numberless the buffaloes and other ruminants were at that time in the New World, its grass-eating population was far below what the prairies could maintain. If millions of intruders have found plenty of food without starving out the former population of the prairies, we must rather conclude that the Europeans found a want of grass-eaters in America, not an excess. And we have good reasons to believe that want of animal population is the natural state of things all over the world, with but a few temporary exceptions to the rule. The actual numbers of animals in a given region are determined, not by the highest feeding capacity of the region, but by what it is every year under the most unfavourable conditions. So that, for that reason alone, competition hardly can be a normal condition but other causes intervene as well to cut down the animal population below even that low standard. If we take the horses and cattle which are grazing all the winter through in the Steppes of Transbaikalia, we find them very lean and exhausted at the end of the winter. But they grow exhausted not because there is not enough food for all of them — the grass buried under a thin sheet of snow is everywhere in abundance — but because of the difficulty of getting it from beneath the snow, and this difficulty is the same for all horses alike. Besides, days of glazed frost are common in early spring, and if several such days come in succession the horses grow still more exhausted. But then comes a snow-storm, which compels the already weakened animals to remain without any food for several days, and very great numbers of them die. The losses during the spring are so severe that if the season has been more inclement than usual they are even not repaired by the new breeds — the more so as all horses are exhausted, and the young foals are born in a weaker condition. The numbers

of horses and cattle thus always remain beneath what they otherwise might be; all the year round there is food for five or ten times as many animals, and yet their population increases extremely slowly. But as soon as the Buriate owner makes ever so small a provision of hay in the steppe, and throws it open during days of glazed frost, or heavier snow-fall, he immediately sees the increase of his herd. Almost all free grass-eating animals and many rodents in Asia and America being in very much the same conditions, we can safely say that their numbers are not kept down by competition; that at no time of the year they can struggle for food, and that if they never reach anything approaching to over-population, the cause is in the climate, not in competition.

The importance of natural checks to over-multiplication, and especially their bearing upon the competition hypothesis, seems never to have been taken into due account. The checks, or rather some of them, are mentioned, but their action is seldom studied in detail. However, if we compare the action of the natural checks with that of competition, we must recognize at once that the latter sustains no comparison whatever with the other checks. Thus, Mr. Bates mentions the really astounding numbers of winged ants which are destroyed during their exodus. The dead or half-dead bodies of the *formica de fuego* (*Myrmica sœvissima*) which had been blown into the river during a gale “were heaped in a line an inch or two in height and breadth, the line continuing without interruption for miles at the edge of the water.” Myriads of ants are thus destroyed amidst a nature which might support a hundred times as many ants as are actually living. Dr. Altum, a German forester, who wrote a very interesting book about animals injurious to our forests, also gives many facts showing the immense importance of natural checks. He says, that a succession of gales or cold and damp weather during the exodus of the pine-moth (*Bombyx pini*) destroy it to incredible amounts, and during the spring of 1871 all these moths disappeared at once, probably killed by a succession of cold nights. Many like

examples relative to various insects could be quoted from various parts of Europe. Dr. Altum also mentions the bird-enemies of the pine-moth, and the immense amount of its eggs destroyed by foxes; but he adds that the parasitic fungi which periodically infest it are a far more terrible enemy than any bird, because they destroy the moth over very large areas at once. As to various species of mice (*Mus sylvaticus*, *Arvicola arvalis*, and *A. agrestis*), the same author gives a long list of their enemies, but he remarks: “However, the most terrible enemies of mice are not other animals, but such sudden changes of weather as occur almost every year.” Alternations of frost and warm weather destroy them in numberless quantities; “one single sudden change can reduce thousands of mice to the number of a few individuals.” On the other side, a warm winter, or a winter which gradually steps in, make them multiply in menacing proportions, notwithstanding every enemy; such was the case in 1876 and 1877. Competition, in the case of mice, thus appears a quite trifling factor when compared with weather. Other facts to the same effect are also given as regards squirrels.

As to birds, it is well known how they suffer from sudden changes of weather. Late snow-storms are as destructive of bird-life on the English moors, as they are in Siberia; and Ch. Dixon saw the red grouse so pressed during some exceptionally severe winters, that they quitted the moors in numbers, “and we have then known them actually to be taken in the streets of Sheffield. Persistent wet,” he adds, “is almost as fatal to them.”

On the other side, the contagious diseases which continually visit most animal species destroy them in such numbers that the losses often cannot be repaired for many years, even with the most rapidly-multiplying animals. Thus, some sixty years ago, the sousliks suddenly disappeared in the neighbourhood of Sarepta, in South-Eastern Russia, in

consequence of some epidemics; and for years no sousliks were seen in that neighbourhood. It took many years before they became as numerous as they formerly were.

Like facts, all tending to reduce the importance given to competition, could be produced in numbers. Of course, it might be replied, in Darwin's words, that nevertheless each organic being "at some period of its life, during some season of the year, during each generation or at intervals, has to struggle for life and to suffer great destruction," and that the fittest survive during such periods of hard struggle for life. But if the evolution of the animal world were based exclusively, or even chiefly, upon the survival of the fittest during periods of calamities; if natural selection were limited in its action to periods of exceptional drought, or sudden changes of temperature, or inundations, retrogression would be the rule in the animal world. Those who survive a famine, or a severe epidemic of cholera, or small-pox, or diphtheria, such as we see them in uncivilized countries, are neither the strongest, nor the healthiest, nor the most intelligent. No progress could be based on those survivals — the less so as all survivors usually come out of the ordeal with an impaired health, like the Transbaikalian horses just mentioned, or the Arctic crews, or the garrison of a fortress which has been compelled to live for a few months on half rations, and comes out of its experience with a broken health, and subsequently shows a quite abnormal mortality. All that natural selection can do in times of calamities is to spare the individuals endowed with the greatest endurance for privations of all kinds. So it does among the Siberian horses and cattle. They are enduring; they can feed upon the Polar birch in case of need; they resist cold and hunger. But no Siberian horse is capable of carrying half the weight which a European horse carries with ease; no Siberian cow gives half the amount of milk given by a Jersey cow, and no natives of uncivilized countries can bear a comparison with

Europeans. They may better endure hunger and cold, but their physical force is very far below that of a well-fed European, and their intellectual progress is despairingly slow. “Evil cannot be productive of good,” as Tchernyshevsky wrote in a remarkable essay upon Darwinism.

Happily enough, competition is not the rule either in the animal world or in mankind. It is limited among animals to exceptional periods, and natural selection finds better fields for its activity. Better conditions are created by the elimination of competition by means of mutual aid and mutual support. In the great struggle for life — for the greatest possible fulness and intensity of life with the least waste of energy — natural selection continually seeks out the ways precisely for avoiding competition as much as possible. The ants combine in nests and nations; they pile up their stores, they rear their cattle — and thus avoid competition; and natural selection picks out of the ants’ family the species which know best how to avoid competition, with its unavoidably deleterious consequences. Most of our birds slowly move southwards as the winter comes, or gather in numberless societies and undertake long journeys — and thus avoid competition. Many rodents fall asleep when the time comes that competition should set in; while other rodents store food for the winter, and gather in large villages for obtaining the necessary protection when at work. The reindeer, when the lichens are dry in the interior of the continent, migrate towards the sea. Buffaloes cross an immense continent in order to find plenty of food. And the beavers, when they grow numerous on a river, divide into two parties, and go, the old ones down the river, and the young ones up the river and avoid competition. And when animals can neither fall asleep, nor migrate, nor lay in stores, nor themselves grow their food like the ants, they do what the titmouse does, and what Wallace (Darwinism, ch. v) has so charmingly described: they resort to new kinds of food — and thus, again, avoid competition.

“Don’t compete! — competition is always injurious to the species, and you have plenty of resources to avoid it!” That is the tendency of nature, not always realized in full, but always present. That is the watchword which comes to us from the bush, the forest, the river, the ocean. “Therefore combine — practise mutual aid! That is the surest means for giving to each and to all the greatest safety, the best guarantee of existence and progress, bodily, intellectual, and moral.” That is what Nature teaches us; and that is what all those animals which have attained the highest position in their respective classes have done. That is also what man — the most primitive man — has been doing; and that is why man has reached the position upon which we stand now, as we shall see in the subsequent chapters devoted to mutual aid in human societies.

Creatures from Different Stages of Evolution by Konstantin Tsiolkovsky

A molecule, according to our hypothesis, is an infinitely complex matter. Creatures known to us - as well as those who supposedly live close to suns and on planets - are composed or built from molecules of different types (oxygen, hydrogen, iron, carbon, etc.). Let's look back to the past and imagine the Universe billions of decillions - or as many as you like - years ago. At that time molecules were less complex, and there were other planets, other suns and other creatures, composed from these more simple molecules. When forming chemical compounds, they emitted light of other kind, which now is invisible for us; it couldn't be perceived by our organs of sight because the size of ether waves was smaller at that time and ether environment was different - thinner and more resilient. Creatures of those days were less dense but they also were subject to evolution, they also struggled for existence; they also became - ages ago - the acme of perfection, and they became immortal rulers of the world, they achieved what humans still are to achieve and what space dwellers akin to us have already achieved, and they obtained bliss.

Could they manage to survive up to now and are they living among us invisible? Or maybe they decomposed, giving birth to creatures of our visible world? This issue is rather difficult to tackle. A philosopher would say that the origin of matter is common; however, matter, undergoing continuous and, as it seems, simultaneous evolution, exists in the great number of kinds: from dense metals to ether, which is trillions of times less dense. If the previous types of unorganized matter somehow managed to preserve, having no intelligence, all the more reason sentient beings could preserve.

Bacteria and the other Protista have existed for ages, but they gave birth to other beings, including humans. But do invisible suns, planets and creatures surround us, like bacteria, which only now humans are able to see? Where do these higher ones live?

Do they inhabit only certain corners of Universe or are they dissipated everywhere and can live wherever they want? What are their properties? Do they have any connections with currently existing creatures? Do they represent the beginning of life for humans and celestial creatures - related to them, although perfect? Or do they represent their soul (or its part)? Do they for some purpose possess animals or humans at conception? Odd questions with no answers. All the same, let's try to answer the last question, i.e. do these creatures of the past serve as a foundation of a man, do they enter his body at birth and do they represent his soul with its properties?

But, firstly, all properties of a man's body and soul find explanation in morphology of his body and brain. And even if not all of them are explained yet, we can hope that in future they will be.

Secondly, if these beings enliven a man, it is difficult to deny the same to an animal. At conception all of them must be inhabited by spirits from earlier days. It looks rather odd! Why do they need suffer in animal and human bodies?! And, finally, why then a man or an animal does not become perfect (in its way) immediately, if a spirit inhabits him at birth? Why a baby is not so clever, as an adult? Why do we acquire intelligence by means of schooling and labor? How does perfection of spirit always depend on the type of animals and perfection of their organs? (To explain this, there is a lousy hypothesis about preestablishment). Why does with destruction of organs spirit weaken as well? Why a higher spirit doesn't take possession of some fly and turn it into Newton?

It seems to me – well, I do believe – at least my philosophy tells me that special creatures incomprehensible for us exist -but they do not live in our bodies, neither they live in bodies of plants and animals. Only primitive ignorance could make up such a hypothesis to explain phenomena of life when morphology of living creatures wasn't studied at all...

So, in regard to our world we come back to atomism with its potential for life... Imagine a "dead" planet; it has just covered with a hard crust, which becomes the cradle of life. Life develops, spreads and covers the surface of a celestial body. So it was on every planet, number of which is infinite.

Now imagine an incandescent planet shining like a sun. It consists of mixture of thin gases. What could be inside it?! What life could exist here?! It looks as though there is none. But our little sun cools off and inevitably becomes filled with life. If life appears there, it did exist before - but in other, simpler, form. Everything is alive - in its own way. We cannot understand all. Life is continuous, and so is everything. Sometimes it makes abrupt jumps (the phenomenon of "death") - but that's all. In fact, a country sometimes falls suddenly. Sometimes it takes a higher form, and sometimes spirals into utter chaos: its members are beaten unmercifully, taken captive, et cetera. It is impossible for any location to have no matter, no time, and no space. They are endless, unceasing and eternal. Also, it is impossible for any spot to have no life. Life is also eternal, continuous and omnipresent. Let's now step back, taking a mental look at the time decillions of years before ours, - why not take such a step - or much longer one - back! At that time matter and molecules were even simpler and creatures were even less dense. They made up the third world, not visible even to the second one, which, certainly, cannot be perceived by our sense organs so far. Whatever number of such steps we did, however far we leaped through decillions of years, to the beginning of the world, we would never reach it – we would be as distant from it, as we previously were. This follows from our hypotheses of time being beginningless and matter being endlessly divisible. While proceeding back by giant time steps, we meet more and more new worlds of living and intelligent creatures, endless gradations of generations, becoming more and more ethereal. There is no end to these snapshots, like there is no end to time - either to past, or to future. Could it be true that all these creatures transformed - like less

dense matter transforms into denser one? How come reasonable creatures appeared to be less powerful than unorganized matter, which preserved, as I have already said, in different densities! If part of them remained, aren't these creatures simpler, like bacteria are simpler than animals and humans? No answer to this question as well.

I think that both simple and sophisticated ones – more sophisticated than humans and even their perfect descendants - could have remained. Assuming transformation or destruction of some of them, it is difficult to assume that all of them underwent transforming or destruction – how could it happen, whilst there are lots of categories?! If they preserved, are they connected with one another, do one serve, as we already mentioned, as foundation for subsequent ones? These questions are tough, but everything is possible.

Are these creatures servants of space, and should we be the same? How society of every category is organized? Are there upper and lower creatures among them? This is a quote from my "Ethics". In support of these ideas, we have a great number of facts, collected by trustworthy people. These facts suggest presence of some forces, some reasonable beings, interfering into our human life. They cannot be always explained from the point of modern science, relying on forces of nature known to us, not supposing existence of a special intelligent force. Frankly speaking, until recently I, staggered by brilliant light of science, denied all mysterious phenomena and explained them either by known natural laws or by hallucinations, deception, conjuring tricks, forgetfulness, ignorance, by effect of sickness, et cetera. Now I think that more than 99% of these phenomena are exactly such, as I considered them before. But not all of them. Some very small part of them, despite being natural, cannot be explained without intervention from reasonable forces, originating from conscious creatures unknown to us. Some of these creatures are similar to us (my monism), they only are more perfect, and we will be like them (evolution), other ones consist of more light elements, which dominated decillions of decillions years

ago. It is difficult to determine what kind of these creatures interferes into our life. It is simpler to suppose participation of beings similar to us – which developed from creatures as imperfect as we currently are.

Certainly, it does not contradict with known forces of nature, but until now we denied possibility that other creatures could participate in earthly life. The concept of it was the following. Humankind is tied down to Earth. Its destiny is to remain in such a state forever. Destiny of other creatures on other planets is the same. The general idea of development of a man and his power was limited. We hardly can imagine anything higher than earthly creatures in terms of qualities and technology. That is why, having such a restricted outlook, we deny possibility of other creatures' interference into earthly affairs. This error is a minor one. It is not in the drawbacks of science, but only in narrow-mindedness of conclusions driven from it. Plenty of the phenomena from this narrow point of view remain inexplicable.

Conclusion

This anthology was compiled for the purpose of granting exposure to the ideas of J. Posadas and other unique and weird thinkers about humanity, nature, socialism, and the future. It is my sincere hope that at least one of these essays has instilled a greater fascination of the world and hope for the future in you. There is so much potential in each human being and I hate to see it wasted in mass production where our brains are numbed down for the purpose of excess. The rallying cry of the French riots of '68 was *demandez l'impossible*, demand the impossible, and that is really fitting for the theme here. The authors here imagined a new world under socialism that would be ripe with scientific and philosophical possibility. Man, no longer chained by profit, would ascend to the heavens and become something greater. These ideas are something to still be fought for today against the prevailing order who sell us lies of infeasibility. If they call it impossible then we must demand it. After all, what more do we have than progress.

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